FOUNDRY

NOVEMBER
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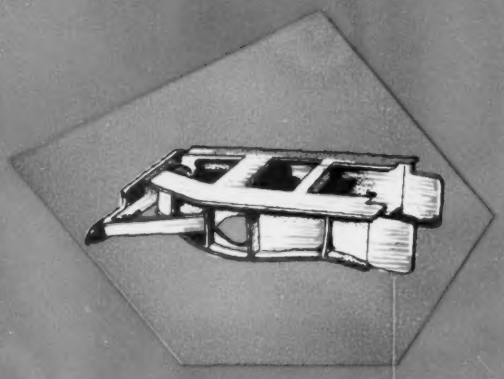
A PENTON PUBLICATION



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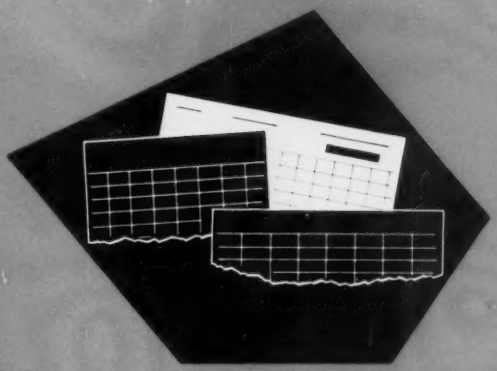

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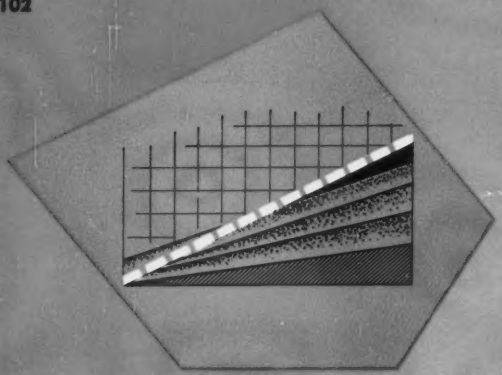

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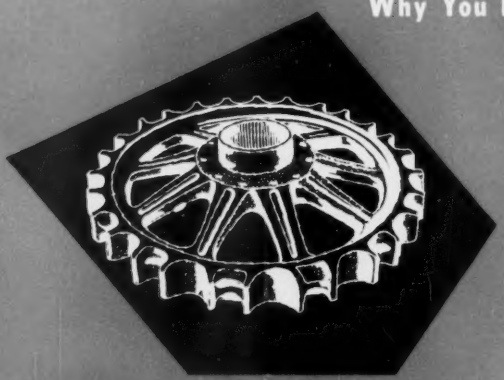

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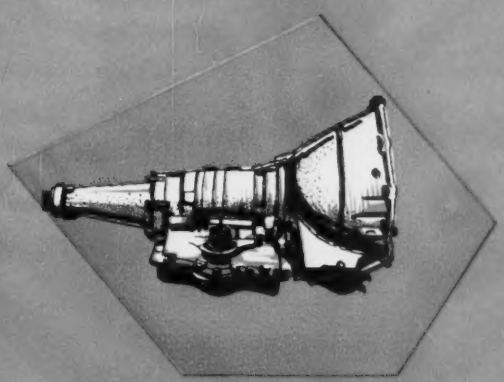

Diecasting Transmission Parts
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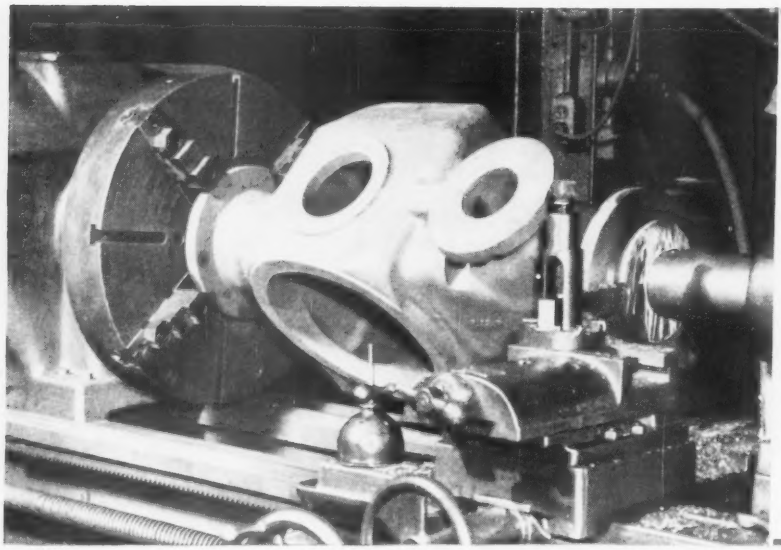
PROVED BY INDEPENDENT LABORATORY TESTS:

42.5% S·M·I*

for FERROCARBO®-TREATED IRON



Finer grained, denser, and stronger castings result from FERROCARBO-treated iron. This has been proved by comparative tests conducted in several independent laboratories on untreated iron and FERROCARBO-treated iron of the same chemistry. Rapid, controlled disintegration of this patented cupola additive by CARBORUNDUM produces a more fluid iron and therefore a more machinable casting due to fewer segregations and chilled or hard spots. Make sure that FERROCARBO has a place in your production picture.

* Surface Machinability Improvement

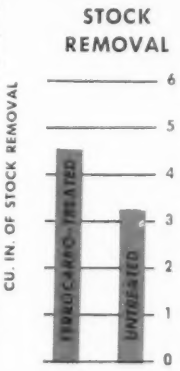
Tool wear tests were conducted with a single point "Carboloy" grade 44A tool on castings machined at commercial speeds. Flank wear was measured with a 20 power microscope.

HOW TESTS WERE CONDUCTED

These outstanding test results were obtained by one independent research laboratory on Molybdenum-Chromium Alloyed Gray Iron cast by a large Midwest foundry, using untreated and FERROCARBO-treated iron of identical chemistry.

WRITE FOR MORE INFORMATION on how FERROCARBO produces more machinable iron regardless of metal composition. Ask for booklet A-1409, Electro Minerals Division, The Carborundum Company, Niagara Falls, New York.

Chemical Analyses	Untreated	Ferrocarbo® Treated
TC	3.36	3.38
Si	2.17	2.19
P	0.12	0.12
Mo	0.60	0.41
Cr	0.39	0.51
CE	4.08	4.11
Cutting speed (ft. min.)	315	315
Feed (in. rev.)	.009	.009
Depth of cut (in.)	.062	.062
Wear Land (in.)	.015	.015
Vol. of metal removed (cu. in.)	3.3	4.7
Percent improvement		42.5%



ELECTRO MINERALS DIVISION

The CARBORUNDUM Company

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Circle 551 on Page 51

B.F.Goodrich report:

Too hot to handle but it travels on rubber

B. F. Goodrich improvements in rubber brought extra savings

Problem: That fog you see is a cloud of smoke and steam rising from sizzling hot sand on conveyor belt in a foundry. The sand is a scorching 300 degrees—so hot it was ruining belts in a few months.

What was done: When a B.F.Goodrich distributor heard of the problem, he recommended a new conveyor belt called Solarflex. This belt, designed by B.F.Goodrich engineers, is made of a special rubber that stays soft and pliable at temperatures that cause other belts to harden, crack and finally break down.

Savings: The B.F.Goodrich hot-material belt you see here had lasted 30 per cent longer than the previous belt when the picture was taken. It had performed for 9 months — old age for a belt working 16 hours a day, 5 days a week, hauling 60 tons of hot sand an hour.

Extra benefits: Because the B.F.Goodrich Solarflex belt stays flexible even when exposed to high heat, it not only lasts longer than other hot-material belts, but also reduces maintenance costs because it holds fasteners better.

Where to buy: Your B.F.Goodrich distributor has full information on the conveyor belt described here. And, as a factory-trained specialist in rubber products, he *can* answer your questions about *all* the rubber products B.F.Goodrich makes for industry. *B.F.Goodrich Industrial Products Company, Dept. M-193, Akron 18, Ohio.*

B.F.Goodrich

INDUSTRIAL PRODUCTS

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Circle 551 on Page 51

HERE'S ALL YOU NEED

If it's easier, better sand control you're after—here's the answer! These three materials, added in varying amounts to sand (dry or in slurry), will give you *close control* over green and dry strength and carbon content, and also provide GREATER FLOWABILITY and LESS LUMPY SHAKEOUT!

GREEN BOND Bentonite excels in developing and controlling green and dry strength. Its medium to low viscosity cuts down on mulling time and permits slurry users to add more bentonite per gallon of slurry, without strain on the pumping system. CROWN HILL Seacoal is exceptionally low in sulphur content, which means your castings will have more easily machined surfaces. Federal SAND STABILIZER improves the flowability of sand and eliminates lumps in sand shakeout. It burns out faster than any other facing material. Since it has a very low ash content and has no deteriorating effect on sand, you can re-use your molding sand *safely*.

And this is important—these advantages, plus many others, are yours at low cost. For these sand additives will actually cost you *less than $1.00 per ton of castings produced!* To learn more about them, write for your copy of "*Tailor-Made Molding Sands*".

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FOUNDRY
A PENTON PUBLICATION

November 1957
Volume 85—Number 11

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(For addresses of branch offices, see Page 281)

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FOUNDRY is edited primarily for management, production, technical, and purchasing personnel in foundries. A copy is sent at no cost to each metal casting plant in the U. S. and Canada employing 20 or more workers and to selected smaller foundries. Additional copies are sent to each foundry to the extent necessary to serve all key foundry personnel on a personal or routed basis. A limited number of copies is supplied at no cost to educational institutions, consultants, and research insitutions where a direct foundry industry relationship exists.

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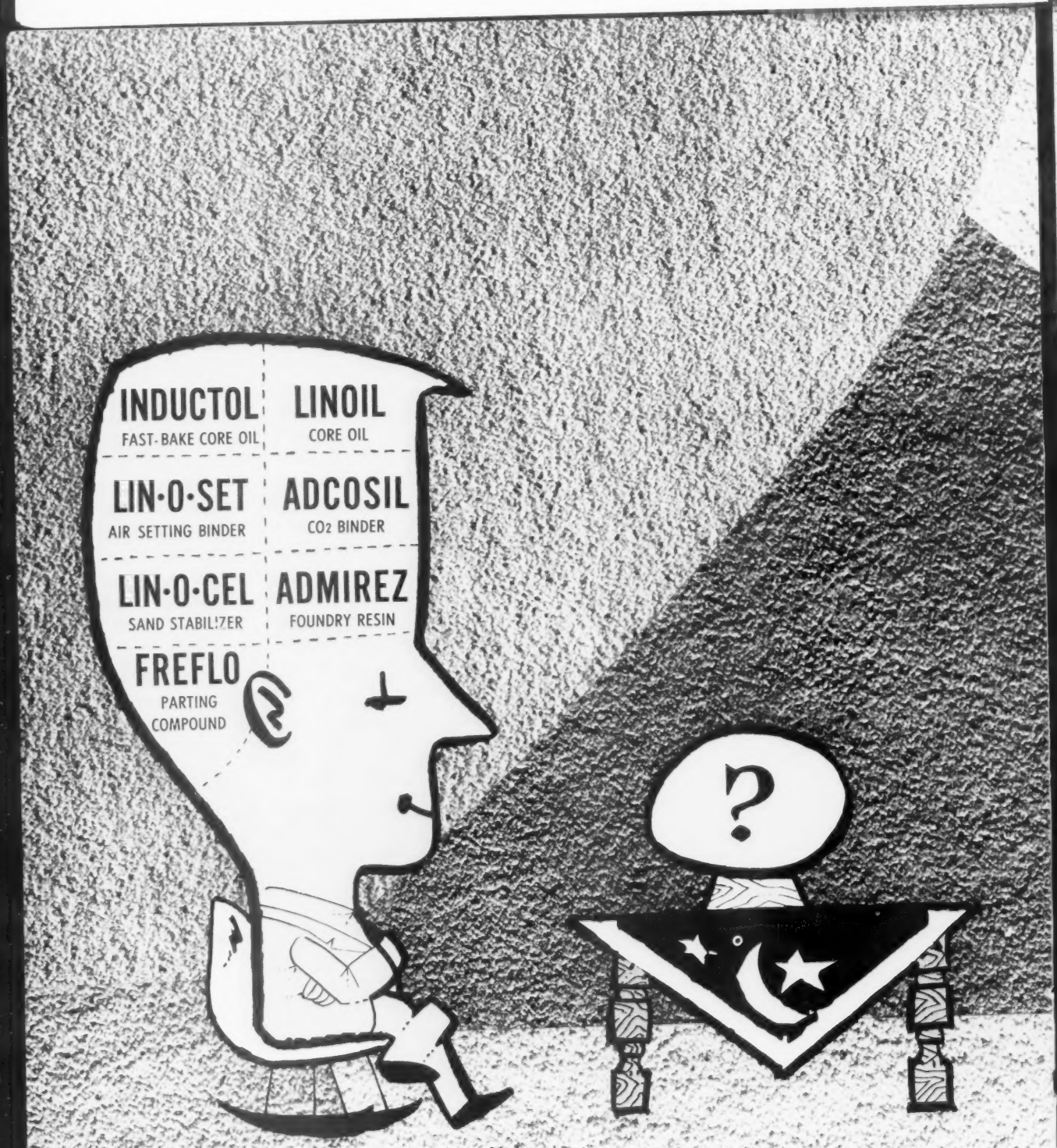

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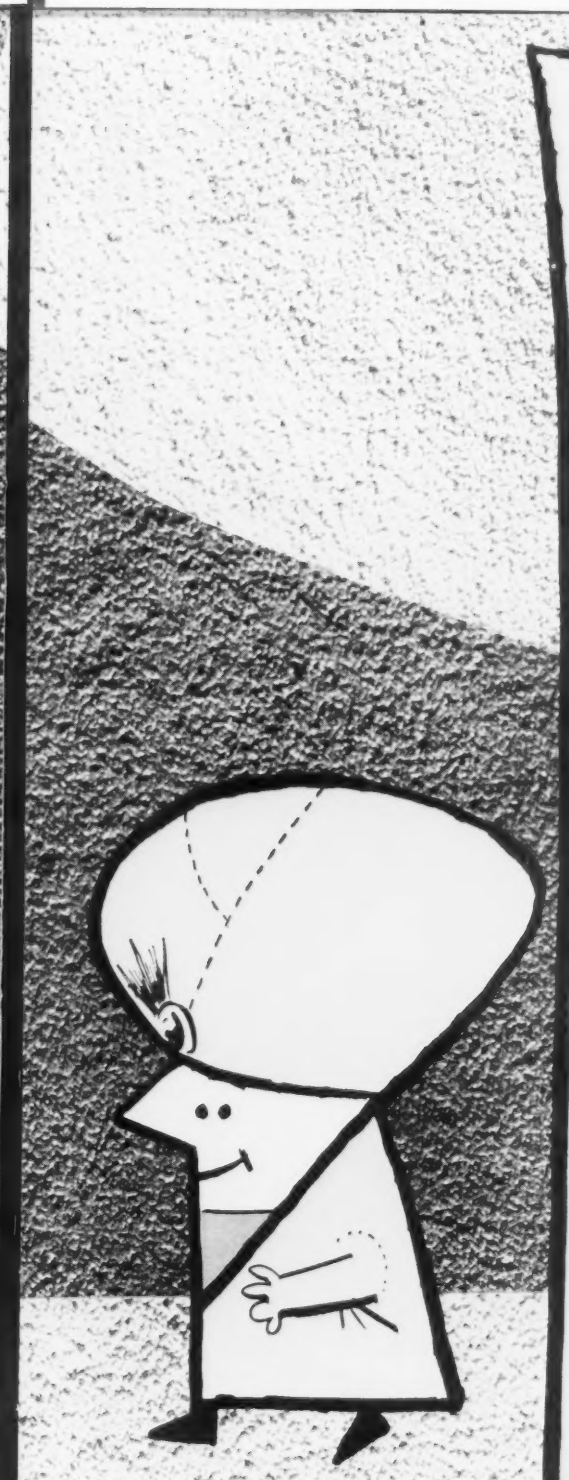

company

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There's an ARCHER QUALITY foundry product in your future

. . . if you're in the foundry business. That's because ADM makes a binder for every type core, for every core making system and for every type sand.

One source helps you get what you want when you want it, whether it's a standard oil-sand binder (one of the famous LINOILS for instance) or whether you're gassing cores and need an efficient special binder for CO_2 cores.

There's seldom a delay since ADM can ship from any one of a huge network of plants and warehouses across the country.

Equally diversified is the army of ADM representatives; each man is technically qualified to make practical suggestions on various processes and corresponding binders. They have no axe to grind for any single type of binder, because ADM supplies them all.

These are the reasons why it doesn't take a swami to predict that there's an Archer Quality Foundry Product somewhere in your future.

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Augmenting the Archer Quality Line . . .

These additional foundry products are available through ADM'S new subsidiary, The FEDERAL FOUNDRY SUPPLY Company:

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WHIRLMIX SAND MIXERS
FEDERAL GREEN BOND BENTONITE
FEDERAL SAND STABILIZER
CROWN HILL SEA COAL
. . . and a COMPLETE LINE of FOUNDRY FACINGS

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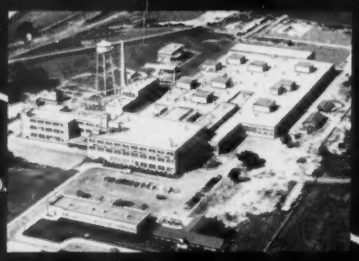

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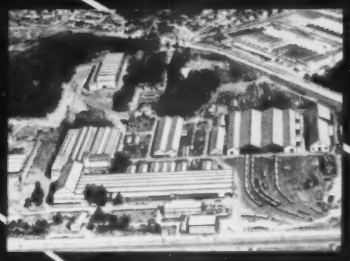
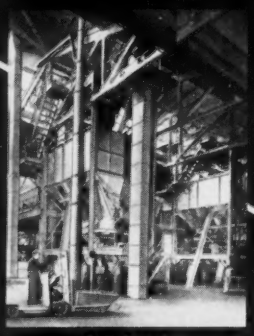


CIA. BRASILEIRA DE MATERIAL FERROVIARIO
(Cobrasma)
SAO PAULO, BRAZIL



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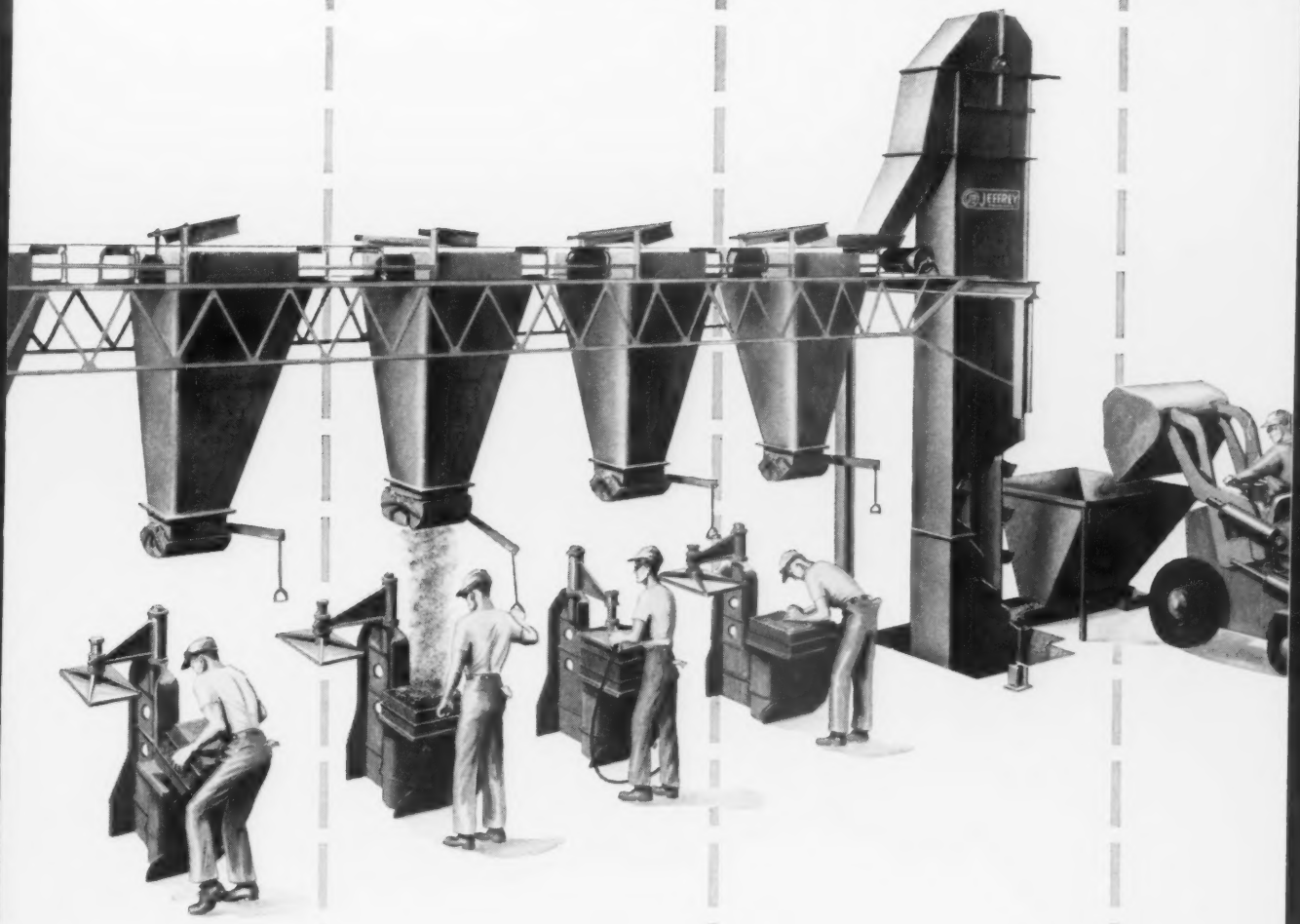

WITH 4 MOLDERS ...OR A DOZEN

...WITH 2 OR 3

...OR EVEN A 1-STATION UNIT

Speeds production...cuts molding costs

JEFFREY OVERHEAD SAND SYSTEM

Here's automation which can be *profitably* applied to small foundries as well as big ones . . . the low-cost, easy-to-install Jeffrey overhead sand system. Whether you have a single molding station or a dozen, it will speed production and reduce your molding costs.

Sand is always available at the molding machine and it doesn't have to be lifted from the floor. Molders' time is saved, their work made easier when sand flows directly from overhead hoppers into the flasks.

These Jeffrey overhead sand units were designed to bring big-foundry advantages to small foundries . . . at low cost. Built as package units, savings in engineering and manufacturing costs are passed along to you. For complete information, get in touch with The Jeffrey Manufacturing Company, 907 North Fourth Street, Columbus 16, Ohio.

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Circle 558 on Page 51

DoALL FRICTION SAWING...Unchallenged as the Most Economical Way to Trim Ferrous Castings!

HOW FRICTION IS PUT TO WORK
The friction generated between the work and the fast moving saw band literally *softens* the metal *ahead* of the saw teeth. The teeth hog out this softened metal at cutting rates far in excess of ordinary sawing techniques.

Removes gates and risers up to 50% faster than any other method!

LOW LABOR COSTS! DoALL Zephyr band machine has the fastest cutting rate, enabling the operator to turn out more work in less time than with other types of equipment.

LOW TOOL COST! New type specially designed DoALL Friction Saw Bands have correct metallurgical characteristics to provide exceptional flex life under the high blade speeds required. Exclusive heat treating resists abrasion and "anchors" hardened teeth securely to the band.

LOW FINISHING COSTS! Closer and relatively burr-free cutting minimizes or eliminates secondary machining operations.

ACCESSIBILITY! Reaches "hard-to-get-at" gates quickly and safely.

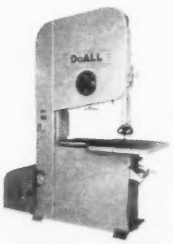
Zephyr Band Machine Has Everything For Friction Sawing Performance

Sustained, high production friction sawing is now an everyday operation for DoALL Zephyrs in many foundries. Straight cutting, trimming, removing gates and risers—are just a few of the many jobs being performed many times faster and at lower cost!

No other machine tool can match its blade speeds—infinitely variable up to 15,000 FPM! For super strength and rigidity, the Zephyr has welded box girder construction—similar to that used in modern skyscrapers. The welded steel saw carrier wheels and drive system are dynamically and statically balanced to prevent vibration. Ask for complete information. Call DoALL locally, or write.

FREE DEMONSTRATION
Call your DoALL Store today for a free "in-your-plant" demonstration on your regular production jobs.

NEW! DoALL Friction Saw Bands
Ask about these newly improved friction blades. ½", ¾" and 1" widths, 10 and 14 pitch. Sold in 500' coils in "strip-out" containers, or in custom welded lengths to fit any machine.



DoALL Zephyr Band Machines
Four models of DoALL Zephyr Band Machines tailored to your job. Full 35½" throat, with 20" thickness capacity under saw guides.

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Circle 550 on Page 51

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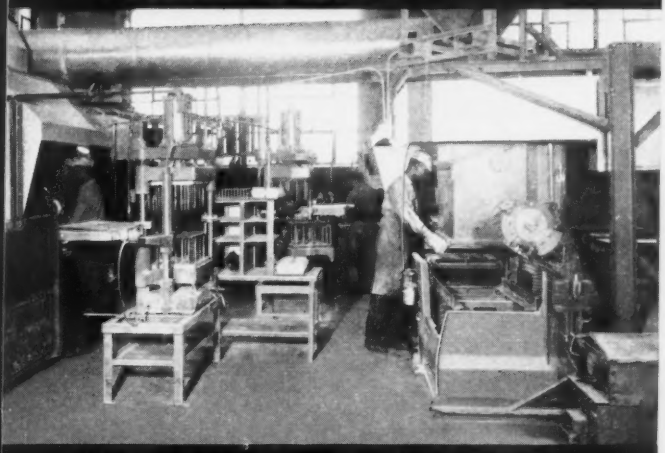
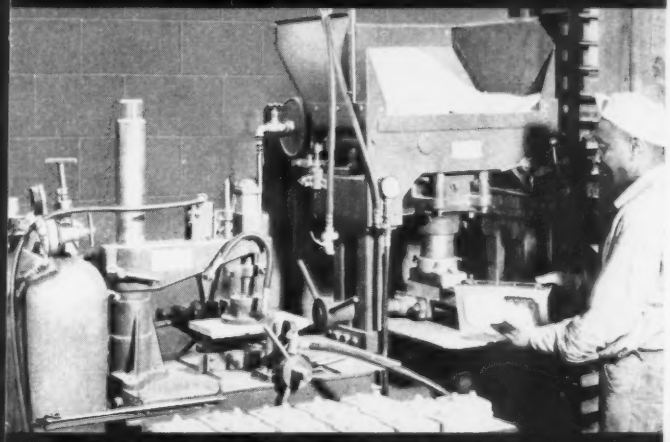
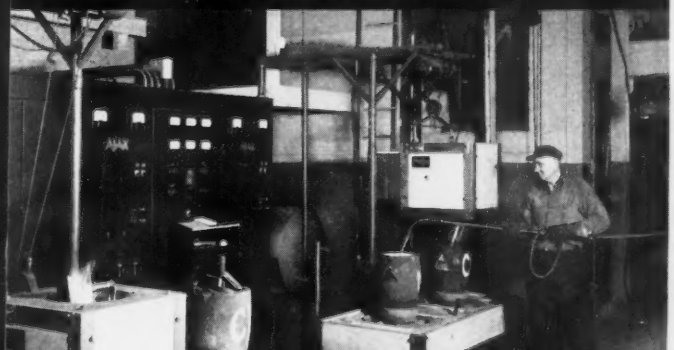
MOLDS—Newest production methods, latest equipment combine to produce high precision, low cost shells on quantity basis.



CORES—Automatic, economical CO_2 shell core-making facilities round out an efficient "mold-a-minute" precision production team.



CASTINGS—Close tolerance, smooth finish, non-ferrous shell-type castings are poured from metal melted in high frequency induction furnaces.



For fast service, fine dimensional accuracy and low over-all cost on small and medium size non-ferrous castings, look to City Pattern Foundry & Machine Company. Here you'll find, too, all the additional facilities . . . a complete, modern pattern shop, foundry, metallurgical laboratory and machine shop . . . that are required to provide an *all inclusive* service on top quality shell process castings.

City Pattern Foundry & Machine Company's experience in the shell process dates back ten years. As a result, here are shell facilities you can count on for all your jobbing needs. We'll be delighted to discuss your needs with you in detail. Why not call or write today.

Circle 560 on Page 51

CITY PATTERN

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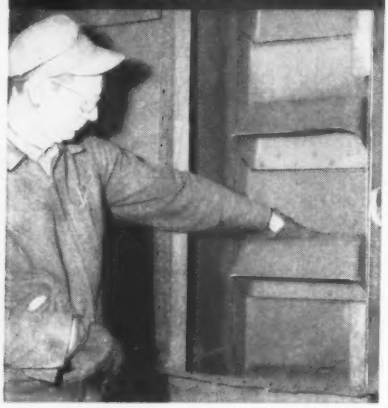
All day, all night lifting sand



Imperial Belt works round the clock moving 400° foundry sand

This Imperial* Sahara* Belt stays scorching hot almost all the time. Operating 24 hours a day at a speed of 258 feet per minute it lifts 400° F. sand in the foundry of Pratt & Letchworth Division of the Dayton Malleable Iron Co., Inc., Buffalo, N. Y.

The belt (90' of 18" x 8 ply Standard Sahara Impregnation 935) has been in use more than a year . . . an unusual record under such heat.

Like all Imperial Belts, it is job-designed for specific operating conditions. Special Impregnating compounds toughen every fiber of the heavy-duty duck base fabric and insulate it from heat damage. INNER-LOCKED* stitching permanently prevents ply separation, makes Imperial belts ideal for bucket elevator use.

Imperial Sahara Belting outwears any other belting made for foundry service...gives you lowest ultimate cost.

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With the Editors

DELPORT HONORED: Since Vincent Delport, European manager of FOUNDRY, was unable to be present at the 1957 annual AFS convention in Cincinnati to receive a "Service Citation," President Harry W. Dietert very kindly arranged to present the award at the closing session of the International Foundry Congress in Stockholm late in August.

Vincent did such a nice job in responding to the presentation that I thought you might like to read it.

"I wish to express my thanks to you, President Everest, and to Mr. Dietert, for the very kind words you have used in introducing and presenting this award to me, and I would ask you, Mr. Dietert, to convey to Chairman Wallis and to the Board of Awards of the American Foundrymen's Society the expression of my deep appreciation at having been one of those selected by them for this new award.

"It was in 1926 that the American Foundrymen's Association invited me to be their European representative in anticipation of their joining the newly formed International Committee of Foundry Technical Associations, which they did at the end of 1927. This appointment came about owing to the friendly relations that existed between the AFA and my own firm, which I represent in London; and here I would like also to pay tribute to the constant support I have received from my firm in this connection.

"Since then it has been my privilege to attend 22 international congresses and, in addition, two extra meetings of the International Committee: One at Liege in 1946, when the International Committee was reconstituted, its activitites having ceased during the war; the other in Buxton in 1950, when no international congress had been held.

"I have derived considerable interest and much pleasure from my connection with the International Committee—not only because it serves the interests of the foundry industry at large—but also because I have always believed that such international meetings, even within a limited field, help considerably toward a better understanding between, at least, a section—and an important section—of the people of the various nations.

"You will appreciate that when International Committee now has a membership of the foundry technical societies of 20 nations—when these delegates hold their meetings, their opinions are bound to differ and the interests they represent do not always coincide. Yet, it has been my experience over the past 30 years that our meetings have always taken place in a friendly atmosphere, free from acrimony and propaganda, and that many decisions have been arrived at by mutual concessions. I could only wish that similar conditions could exist within the more exalted spheres of the United Nations!

"In my association with the International Committee it has been my privilege to acquire many friends from many countries, and in this I greatly rejoice.

"Once again, President Dietert, please assure your Board of Directors that I am deeply appreciative of the honor that your society has conferred upon me."

—o—

Do We Change: Some in the industry will be interested in the following portion of an editorial from the Cincinnati *Inquirer* which was reproduced in the March, 1900, issue of FOUNDRY.

It Is a Long Lane That Has No Turn

In yesterday's *Enquirer* there was a reference to the complaint of some consumers of iron castings that they were unable to get castings as desired. The complaint set forth the attitude of the consumers, and George McG. Morris, Secretary of the John B. Morris Foundry Company, takes the matter up on behalf of the foundrymen. Mr. Morris's statement that the very people who are complaining most loudly now at having to go out of town for castings are the same that patronized out-of-town concerns when business was dull and local concerns could easily have taken care of their orders, is especially worthy of consideration by foundrymen and consumers. "In the first place," says Mr. Morris:

"Those very same consumers of iron castings who are complaining about having to leave this city in order to procure their castings are the same, who, during the dull times between 1893 and 1899, when the iron foundries were running on half time, and with reduced force, gave their work to outside foundries, because they secured prices slightly under those of the Cincinnati concerns. If they did not object then, why should they now? It is true that the foundries are at present crowded with work, but how long will it last? There is bound to come a time when the reaction will take place, and those who start in the business now will be the first to feel the effects, and the result will be a cutting of prices when some will have to give up."—Cincinnati *Enquirer*.

—o—

Credit Is Due: Inadvertently, we neglected to mention in our September issue that two of the articles had been presented at industry meetings. For this omission we apologize and hasten to give credit where it is due. "A Design Engineer Looks at Casting Salesmen," by Byron L. Ertsgaard, was presented at the

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PHONE: TRinity 4-2000

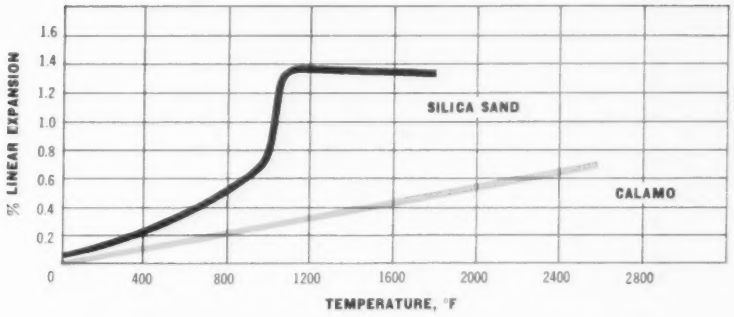
Harbison-Walker

REFRACTORY

MOLD MATERIALS

for metal casting

EXPANSION CURVES, SILICA SAND VS CALAMO



Calamo

CALAMO, one of the extensively used Harbison-Walker products for molding is an alumina-silica refractory of optimum sizings for various molding mixtures. Its fusion point is 100°F. higher than that of normal silica sand mixes.

The chart above shows the exceedingly desirable expansion curve of CALAMO as compared with that of silica sand.

CALAMO, used as the major constituent of precision casting investment mixes, improves the dimensional constancy of the molds, makes them stronger and more resistant to erosion by metal flow. Investment costs are measurably reduced because an appreciably lesser amount of bonding agent is needed. This is attributable to the very desirable particle sizing and the equiaxed, dense grains of CALAMO.

CALAMO, used alone or as the major part of conventional dry sand molding mixes in rammed or in slinger-placed sand molds, provides not only the very desirable low thermal expansion characteristics particularly suited for precision casting but also provides the required refractoriness for metals and alloys which are melted at unusually high temperatures.

H-W Moldsand Bond

H-W MOLDSAND BOND is a highly refractory clay having unusual plasticity and bonding strength for conventional molding. Used alone or with other binders, it imparts enhanced hot strength to molds and in some mixes replaces, wholly or in part, binders of higher cost. It is used with equally good results for the usual rammed mixes with sand or CALAMO. Molding mixes made with H-W MOLDSAND BOND have decidedly improved storage properties.

Write us for information regarding other Harbison-Walker products—mold wash materials—ceramic molding media—shell molding minerals.

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World's Most Complete Refractories Service

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Circle 561 on Page 51

the various nations.

"You will appreciate that when the delegates of many nations—the

Casting Salesmen," by Byron L. Ertsgaard, was presented at the eighth Market Development Confer-

HAUSFELD FURNACES

FOR "ALL-OUT" PRODUCTION IN NON-FERROUS FOUNDRIES

Provide the Utmost in Speed Production and Safety

FURNACES FOR
BRASS • ALUMINUM • MAGNESIUM
AND ALL OTHER
NON-FERROUS ALLOYS

The Campbell-Hausfeld Co.
300-320 MOORE ST. HARRISON, OHIO

ence of the Malleable Founders Society last spring. "Operation and Use of Vibrating Conveyors," by John Chahbandour, was heard at the Eastern Regional Foundry Conference, also held last spring. The editors felt that readers of FOUNDRY would find much of interest in these articles.

—o—

Selling an Industry: The Refractories Institute, First National Bank Building, Pittsburgh 22, recently published a brochure entitled "Your Future in Refractories." The well illustrated and attractive booklet was designed to describe the many opportunities in the refractories industry for trained and ambitious people. In addition to telling something about the typical positions open to engineers in the refractories industry, the booklet gives nontechnical information on refractories, how they are produced, and how they are used.

The institute and its executive secretary, Avery C. Newton, are to be congratulated on this fine piece of work. It should be valuable in selling the industry to young engineers. The foundry industry surely would benefit from a similar project.

—o—

What We Publish: Our Market Research Department recently made a study to determine the general classification of material in 12 issues of FOUNDRY. During the year, a total of 1142 pages of editorial material was published. Major feature articles accounted for 394 pages or 34.5 per cent; other feature articles, 132 pages or 11.4 per cent; regular departments and features, 175 pages or 15.7 per cent; industry news and personals, 155 pages or 13.5 per cent; new equipment and supplies, 130 pages or 11.4 per cent; and association news and proceedings, 156 pages or 13.5 per cent.

A total of 666 pages or 59.3 per cent of the editorial content during the past year was staff prepared. That is a lot of copy in any league.

—o—

The Idea Worked: Thanks to the members of the staff who contributed the interesting material to this department last month.

The department was started in the March, 1950 issue. Each summer since, I have prepared the copy for the October issue while on vacation. In 1950 it was in Vermont and since that time at Gentian Lake in Indiana. But this year I left all of the work at the office.

The idea worked so successfully that you can depend upon my doing it again. And just to complete the record, I did catch some fish.

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IMPORTANT-
to every foundry using the CO_2 process

The "two-step" Jet CO_2 process
JET CO_2 BOND STABILIZER . . . AND THE JET CO_2 BOND SERIES OF BINDERS
produces better molds and cores.

The addition of Jet CO_2 Bond Stabilizer is a big step forward to new efficiency in your CO_2 operation. The Stabilizer improves the flowability and workability of the mulled sand to a degree never before obtainable in the CO_2 process. This is accomplished with the following, simple two-step procedure.

Step 1

JET CO_2 BOND STABILIZER

Step one is the mulling of the sand with ½ to 1% of Jet CO_2 Bond Stabilizer. The sand and stabilizer are mulled before the sodium silicate binder is added to the mix. This forms a base mixture that produces a fluffy, silken sand. The use of Jet CO_2 Bond Stabilizer not only improves flowability and workability but also produces a mulled sand with much longer bench life. It not only produces superior cores and molds but also eliminates ramaway on intricate work. Binder consumption cut as much as 25%. Jet CO_2 Bond Stabilizer will make any sodium silicate binder work better.

Step 2

JET CO_2 BOND

The second step in the process is the addition of the binder to the already mulled sand and stabilizer.

Jet CO_2 Bond is a series of compounded silicate binders developed by the Swan-Finch Laboratories in cooperation with several of the leading foundries in the country. The outcome, a series of products for the CO_2 process assuring maximum strength and hardness, easy ramming, faster gassing and improved collapsibility. Additional qualities of the Jet CO_2 bond series include lower viscosity permitting easier mixing, longer bench life of the mixed sand, less gas evolution and increased storage life of the finished cores.

Working samples and complete literature on Jet CO_2 Bond Stabilizer and the Jet CO_2 Series of Binders will be sent to you on request for test purposes in your foundry. A qualified Swan Finch engineer will gladly help you select one of our series of binders for your particular requirements.

SWAN-FINCH FOUNDRY PRODUCTS

- Jet Bond series of core oil
- Super Jet Drier • Jet liquid parting
- Jet sand conditioner

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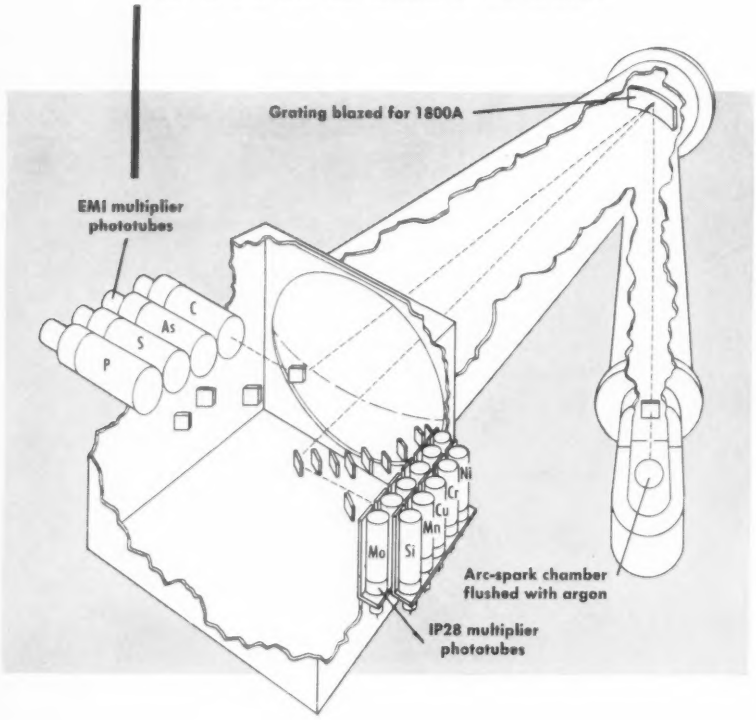
it again. And just to complete the record, I did catch some fish.

F.G.S.

New Quantovac adds C, S, & P to metallic elements for complete high-speed analysis of steel & cast irons



ARL introduces the first large vacuum spectrometer to extend range of direct-reading spectrochemical analysis into far ultraviolet

The iron and steel industry has an important new high-speed analytical tool. For the first time, carbon, sulfur and phosphorus can be analyzed simultaneously with all the metallic elements in a few minutes. These nonmetallic elements no longer require expensive, separate analysis. Now, this one high-speed, direct-reading instrument will do the complete job.

By means of an evacuated spectrometer and argon-flushed arc-spark chamber, the Quantovac extends the spectrum range into the far ultraviolet. It thus provides the most sensitive arc lines of C, S, P, As, and Se for spectrochemical analyses, besides the usual lines of the metallic elements. In fact, as many as 24 elements may be analyzed simultaneously in the 1600-3300A range with the Quantovac.

The Quantovac will provide high-speed furnace control. It will save time and labor. Please write for full information. Your inquiry will be answered fully and promptly.

*TRADE MARK

See the Quantovac at the Metal Exposition, Chicago
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Calendar of MEETINGS

Oct. 31-Nov. 1—Metals Casting Conference, Purdue University, Lafayette, Ind.

Nov. 2-8—American Society for Metals, national metals exposition and congress and 2nd world metallurgical congress, International Amphitheatre, Chicago.

Nov. 3-8—Society for Nondestructive Testing, 2nd international conference on nondestructive testing in conjunction with 17th annual convention, Hotel Morrison, Chicago.

Nov. 7-8—National Foundry Association, annual meeting, Waldorf-Astoria Hotel, New York.

Nov. 11-13—Steel Founders' Society of America, technical and operating conference, Hotel Carter, Cleveland.

Nov. 14-15—Council of Profit Sharing Industries, 10th annual profit sharing conference, Hotel Commodore, New York.

Nov. 18-19—National Air Pollution Control Association, semiannual technical conference, Fairmont Hotel, San Francisco.

Nov. 19-21—Investment Casting Institute, annual fall meeting, Sheraton Hotel, Chicago.

Dec. 3-4—Foundry Facings Manufacturers' Association, annual meeting, Waldorf-Astoria Hotel, New York.

Dec. 4-6—American Institute of Mining, Metallurgical and Petroleum Engineers, electric steel furnace conference, Penn-Sheraton Hotel, Pittsburgh.

Dec. 5-7—National Association of Manufacturers, annual meeting, Waldorf-Astoria Hotel, New York.

1958

Jan. 17—Malleable Founders' Society, semiannual meeting, Hotel Cleveland, Cleveland.

Jan. 27-28—Industrial Heating Equipment Association, annual meeting, Penn-Sheraton Hotel, Pittsburgh.

Jan. 27-30—Plant Maintenance & Engineering Show, International Amphitheatre, Chicago.

Feb. 6-7—Malleable Founders' Society, technical and operating conference, Wade Park Manor, Cleveland.

Feb. 9-14—American Society for Testing Materials, committee week, Statler Hotel, St. Louis.

Feb. 13-14—Wisconsin Regional Foundry Conference, Hotel Schroeder, Milwaukee.

Feb. 16-20—American Institute of Mining, Metallurgical & Petroleum Engineers, annual meeting, Hotels Statler and Sheraton-McAlpin, New York.

Feb. 20-21—Southeastern Regional Foundry Conference, Chattanooga, Tenn.

Mar. 12-13—Foundry Educational Foundation, college-industry conference, Hotel Statler, Cleveland.

Mar. 17-18 — Steel Founders' Society of America, annual meeting, Drake Hotel, Chicago.

May 12-16—American Society for Metals, 1st Southwestern metal congress and exposition, Automobile Bldg., Dallas, Tex.

May 19-23—American Foundrymen's Society, 62nd annual convention and exhibition, Public Auditorium, Cleveland.

June 9-11, Malleable Founders' Society, annual meeting, Homestead, Hot Springs, Va.

June 9-12—National Materials Handling Exposition, Public Auditorium, Cleveland.

June 9-13—International Automation Exposition and Congress, Coliseum, New York City.

June 22-27—American Society for Testing Materials, annual meeting, Statler and Sheraton-Plaza Hotels, Boston, Mass.

Sept. 20-23—Steel Founders' Society of America, fall meeting, Homestead, Hot Springs, Va.

Sept. 23-26—Association of Iron and Steel Engineers, annual meeting, Public Auditorium, Cleveland.

Oct. 8-10—Gray Iron Founders' Society, annual meeting, Sheraton Park Hotel, Washington.

Oct. 27-31—American Society for Metals, national metals exposition and congress, Public Auditorium, Cleveland.

- Jet sand conditioner
- Tykor-liquid core compound
- Jet Resin A • Jet Dri-Binder

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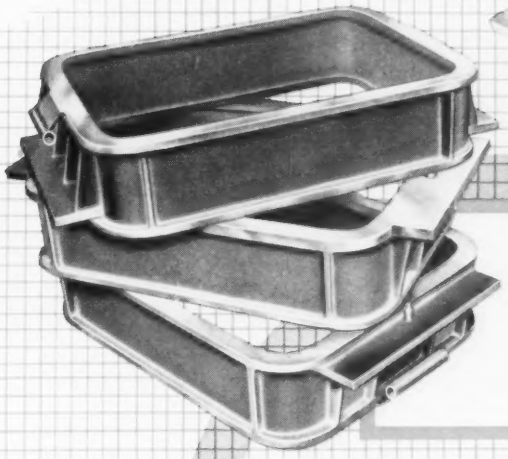
Circle 564 on Page 51

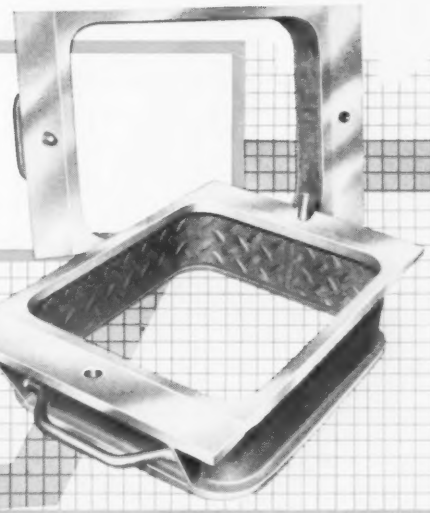
THE BEST FOR ANY MOLDING METHOD

F F E HIGH PRODUCTION FLASKS

FULLY AUTOMATIC

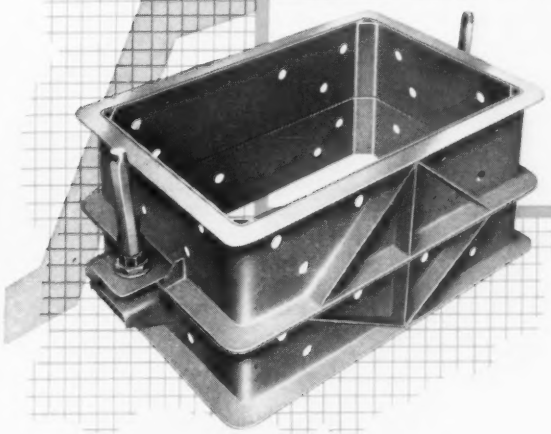
13" x 16", 5" cope, 5" drag, constructed and machined for automatic high-production high-pressure molding. Adaptable for single station and duplexing operations.





SEMI-AUTOMATIC

13½" x 18" x 4½" (jolt-squeeze) cope and drag sections provide the strength and rigidity required for mechanized high-speed molding.



MANUAL

12" x 18", 5" cope, 4" drag, 4 degree tapered tight flasks (weighing less than 40 pounds per set) specifically designed to increase the efficiency and output of manual, squeezer or floor pour operations.

Regardless of your flask requirements, it will pay you to specify F.F.&E. flasks for these "built-in dividends": (1) Job-engineered to provide consistent quality, (2) Competitive prices, (3) Prompt delivery, (4) Helpful engineering service. Call us now. Let us prove that there's an F.F.&E. flask that's *best for your* method.

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tional metals exposition and congress, Public Auditorium, Cleveland.

(Advertisement)

Minerals International Chemicals

A REPORT TO FOUNDRIES

Let's kick it around

with TOM BARLOW

This is probably the last time you will see this particular heading on an Eastern Clay advertisement. I greet this change with mixed emotions. Mixed emotions have been defined as the feelings you get when you see your mother-in-law go off a cliff in *your* Cadillac.

I have become rather fond of the Let's Kick It Around ads in the last few years and many of you have been good enough to tell me you have, too. From that standpoint, I hate to see them go. On the other hand, this new type of ad is actually an extension of the Let's Kick It Around idea. We are going to try to keep these ads very informal and informative. So, although we are discontinuing the title of my pet ad, we are actually extending its scope with this new two-page informative material which will be presented in an easy-going, "me to you" tone.

We hope that you will become regular followers of this column. We will try to give you information that you can use in your foundry practice.

We recently put together a portfolio on high pressure molding. It includes the Plasti-Bond booklet and a Maplex booklet for the sand additions. It also has the Taccone Diaform Molding Machine booklet and a couple of reprints on high pressure molding. One of the most interesting reprints is entitled "Sand for the Foundry" by Larson E. Wile, formerly of Lynchburg Foundry Company. This reprint from Lynchburg's "Iron Worker" gives a complete description of Lynchburg's original work with Plasti-Bond sand and some of the conclusions they reached after a year or so of operation. This booklet can be obtained separately from the high pressure molding portfolio or as part of it as you wish. All you have to do is ask.

pH CONTROL

This is no time or place to be writing a book on pH control because it is still a rather nebulous subject in the foundry business. However, we know that many foundrymen have found it to their advantage to watch the pH of the sand and many of them are doing it.

The usual approach to pH control is to eliminate the disadvantages of what foundrymen used to call a "sour" sand. Sour sands lack proper flowability. They can result in metal penetration; they can produce scabbing and buckling, or undesirable cuts and washes. Sometimes the sand takes on this character through its daily use from the infiltration of unburnt cereals from the core room or cereal addition made to the sand. Sometimes, they come about through the souring of wood flour or cellulose materials. Sometimes, they occur because an acid type wood flour is used. It is not unusual for this condition to exist in a normal daily routine operation.

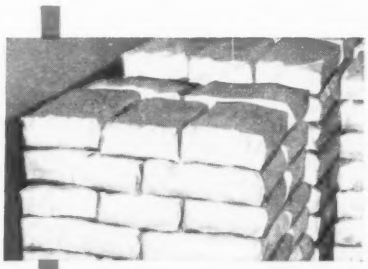
The real common way to get a sour sand is to have the sand system shut down for a period of time such as a vacation period or even over a weekend. Probably the most common occurrence of all, however, is to have a change in the pH of the water being used. There are many factors in the problem of pH.

One of the possible factors and, in most cases, a rather minor one, is the type of clay being used. Changes in the pH by virtue of the clay are much less apt to happen than changes in the pH from all of the other factors involved. However, it is desirable to know the pH of the clay you are working with.

Let us emphasize that we do not add any adulterating materials to any of our clays. **The pH that occurs in these clays is a natural condition and not the result of chemical additions. If chemical additions such as soda ash are to be made, they should be made directly to the sand in the foundry and not to the clays in the manufacturing plant.**

Next month we will tell you a little about the pH characteristics of the types of clay we (and you) work with:

REVIVO BOND . . . . . 5.0 pH
DIXIE BOND . . . . . 6.0 pH
Southern Bentonite
BLACK HILLS . . . . . 9.0 pH
Western Bentonite



PASTED BAGS FOR BENTONITE

We continue to get compliments from our friends on the new packaging being used on both our Black Hills western bentonite and our Dixie Bond southern bentonite. This new pasted bag has a rectangular shape without the flattened ends that you find on sewn bags. As a result, these packages stack like bricks and give you more storage space in your warehouse. Storage is such a problem in foundries that we think you will like this more compact storage and the reduction in space that is required for materials.

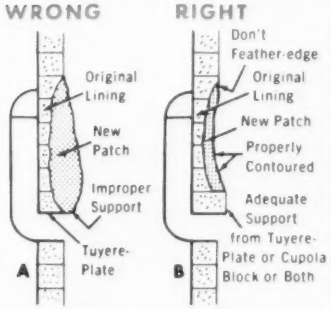
This bag, in addition, reduces leakage and, therefore, the dirt around storage facilities and the foundry. Your men will find the packages are easily picked up, carried and stacked. From the standpoint of economy, you will find that the elimination of "ears" on the bags reduces the likelihood of breakage during handling.

If you are palletizing, you will particularly like the easier, faster, cost-cutting handling of this package. Furthermore, if you have ever had anyone make a mistake and put the wrong kind of clay in the muller, you will be interested in the fact that this pasted package permits us to put our

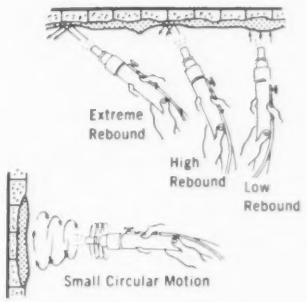
identification marks on the ends as well as on the sides so that the man is much less apt to grab the wrong bag.

DURA PRODUCTS

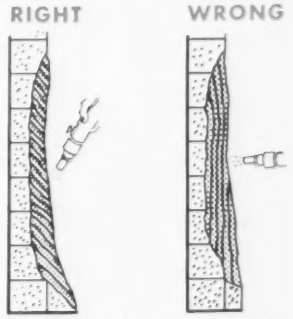
It is surprising how many people put up with sand blowing in their face from the core blowers when the use of Durastrip or Durarod would not only eliminate this blow-by, but reduce costs. Every time the sand blows out at the parting line of the core box used on a core blower, there is excessive wear. As a matter of fact, moving sand under these conditions can wear out steel pretty fast. When blow-by starts, the sand quickly cuts grooves and channels across the parting line face. No metal can withstand this abrasion. The only complete cure is to eliminate it before it starts and the best way to do that is with Durarod or Durastrip. This and other methods of saving money on core boxes are described in our booklet with the rather lengthy title of "If You Operate a Core Blower, You Will Be Interested in Dura Wear Resistant Plastics." We'll be happy to send you a copy.



"A" shows monolithic patch without sufficient support. Slumping or bridging can easily result. "B" shows how the extended tuyere plate or one row of block can provide the proper support for the monolithic lining.



The percentage of rebound depends upon the angle at which the particles hit the wall. A small circular motion with the gun head in such a way as to provide 90-degree impact provides minimum rebound.



By working above the zone to be patched, the operator can develop horizontal layers which minimize spalling.

GOOD GUN PATCHING

One of our most popular pieces of literature is "Gun Placed Silica Cupola Lining." It is a complete description of the best techniques for handling a gun for maximum efficiencies. The article is reprinted from the American Foundrymen's Society Transactions and was originally presented at the 1953 convention in Chicago. The sketches illustrate the right and wrong way to do a couple of things. They are typical of the type of information you will find in this article. Did you know that we have four different Cupoline plants in four different locations to give you complete protection on your source of patching material? If you buy Cupoline from us, you get it from only one source because we ship from the most convenient location (and at the lowest freight rate to you). However, it is nice to know that you are not out on a limb if something happens to one plant. Every foundryman wants reliability of his source of any material. We are proud of the facilities and the ability of IMC to provide you with a reliable source of everything we produce.

NEW LITERATURE

We have been changing much of our advertising literature to give you more fundamental operating information and less "advertising malarky." Two recent booklets cover Maplex wood flour and Plasti-Bond. They are loaded with technical information and presented in practical language.

The Maplex booklet covers the complete properties of green strength, permeability, deformation, hot strength, confined expansions, and gas evolution for four different types of flours including the Maplex type. This information can help you choose the right flour for the particular job.

The Plasti-Bond booklet is a complete description of this additive which is finding wide and expanding use in everything from the highest production automotive shops to the "one casting per pattern" jobbing shop. The case histories illustrate the unique applications for this unusual material.

One of the really different applications shown is called case #4. "A brass foundry faced the problem of drying out in hot weather. When the sand was run at over 4% moisture, it resisted drying but gave poor finish. When the sand was drier, it gave good finish but dried out and caused cuts and washes. The addition of Plasti-Bond held moisture over 4% to resist drying but without any loss in flowability."

Would you like us to send you either or both of these booklets?

International Minerals & Chemicals

EASTERN CLAY PRODUCTS DEPT.

INTERNATIONAL MINERALS & CHEMICAL CORPORATION

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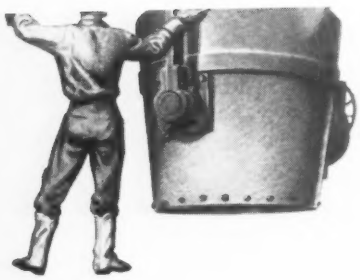
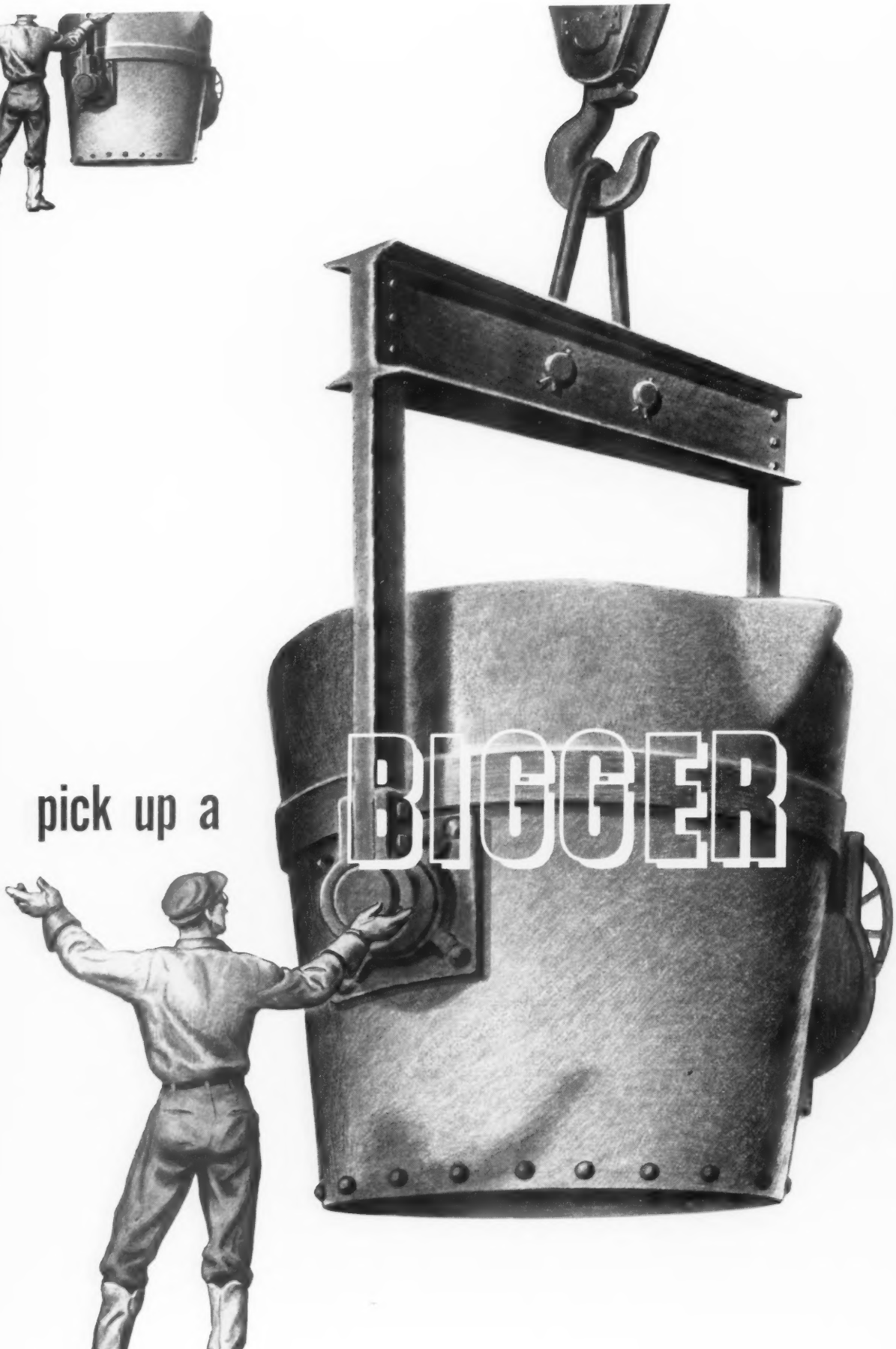
conclusions they reached after a year or so of operation. This booklet can be

tions such as soda ash are to be made,

will be interested in the fact that this pasted package permits us to put our





pick up a BIGGER

Circle 568 on Page 51

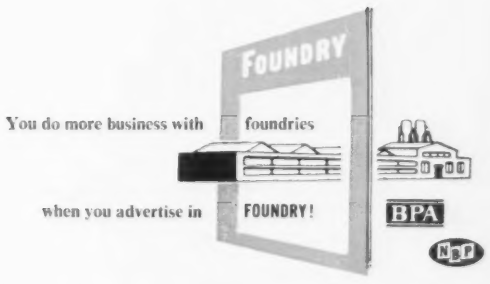
The foundry market has unique advantages. Extra sales—new sales—more sales come fast when you put forth extra effort in this dynamic industry.

Try this now for a bigger share of the $3 billions foundries will spend this year: run a *full* schedule of advertising in FOUNDRY. That takes care of your basic communications job by putting your advertising in front of every known buying influence in the foundries doing over 98% of all the business.

Then add the new power of FOUNDRY's Plus-5 Sales Development Service. It assures *results* now because it features your receiving foundry prospect lists tailored to your special needs! May we tell you more about this unique offer?

Nothing sells foundries like FOUNDRY.

share of this FOUNDRY market . . .



a PENTON Publication / Penton Building, Cleveland 13, Ohio

Circle 569 on Page 51

Miss Liquidizer advises:
Weight Reducing Is Not Without A Plan!

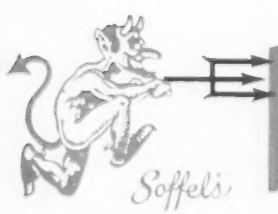
Photo by H. Armstrong Roberts

Soffel's
CARBON FREE LIQUIDIZER

ENABLES YOU TO DRASTICALLY REDUCE THE SIZE OF YOUR FEEDING HEADS

Your plan for increased yield will be effective when you use SOFFEL'S Carbon-Free Liquidizers. Our Carbon-Free Liquidizers for iron, steel, nodular iron, and non-ferrous alloys assure more sound shrink-free castings from each ladle of metal poured.

Contact your PMP *Distributors for a demonstration.*

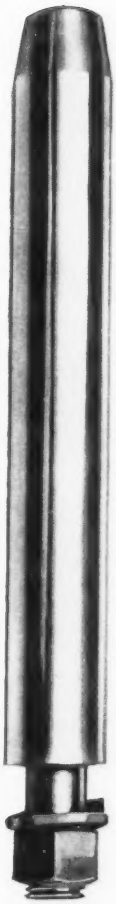


PITTSBURGH METALS PURIFYING CO., Inc.
Mars, Pennsylvania **Phone National 5-8800**

"WORLD'S LARGEST MANUFACTURER OF FLUXES, PURIFIERS AND EXOTHERMIC COMPOUNDS FOR ALL METALS AND ALLOYS"

Circle 571 on Page 51

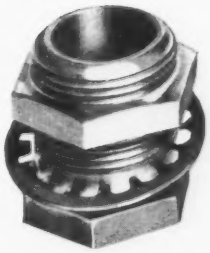
Circle 569 on Page 51



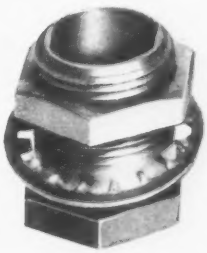
Adams Round Pin
Hardened, Ground,
Hard Chrome Plated

Adams
Round Bushing
(End View)
Open

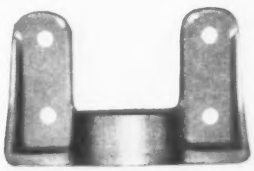
Adams
Elongated Bushing
(End View)
Hexagon Pin Inserted



Adams
Round Bushing
Nut and Lock Washer
Long Flask
Short Plate



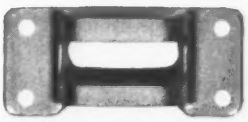
Adams
Elongated Bushing
Nut and Lock Washer
Long Flask
Short Plate



Adams Hexagon Pin
Hardened, Ground,
Hard Chrome Plated

Adams Pins and Bushings for Cherry and Aluminum Flasks assure you top quality and precision for close tolerance operation.

Proper mountings for pins and bushings for all Cherry Flasks are offered to meet practically all of your requirements.



Adams Pin and
Bushing Mountings
(Cast Aluminum)
For Cherry Flasks
For Small Flasks—(Standard)

For New Equipment or as Part Replacement, the same care and accuracy in manufacture helps make the toughest jobs productive.

A wide variety of pin arrangements is included to complete our line. Write us at once for full information.

LET ADAMS HELP YOU ANALYZE YOUR FLASK EQUIPMENT PROBLEMS

The ADAMS Company

ESTABLISHED 1883

700 FOSTER STREET, DUBUQUE, IOWA, U.S.A.

MOLDING MACHINES and FLASK EQUIPMENT

Circle 570 on Page 51

MANSFIELD, OHIO, KNOWS *CCC

Yes, Mansfield is well aware of Commercial Contracting Corporation's team of specialists. That's the town where CCC installed the presses and machine tools in the nation's largest stamping plant. These heavy presses are turning out body stampings for America's major builder of motor cars.

CCC won the job through experience in installing automated equipment . . . for world leaders in the production of steel, aluminum and automobiles.

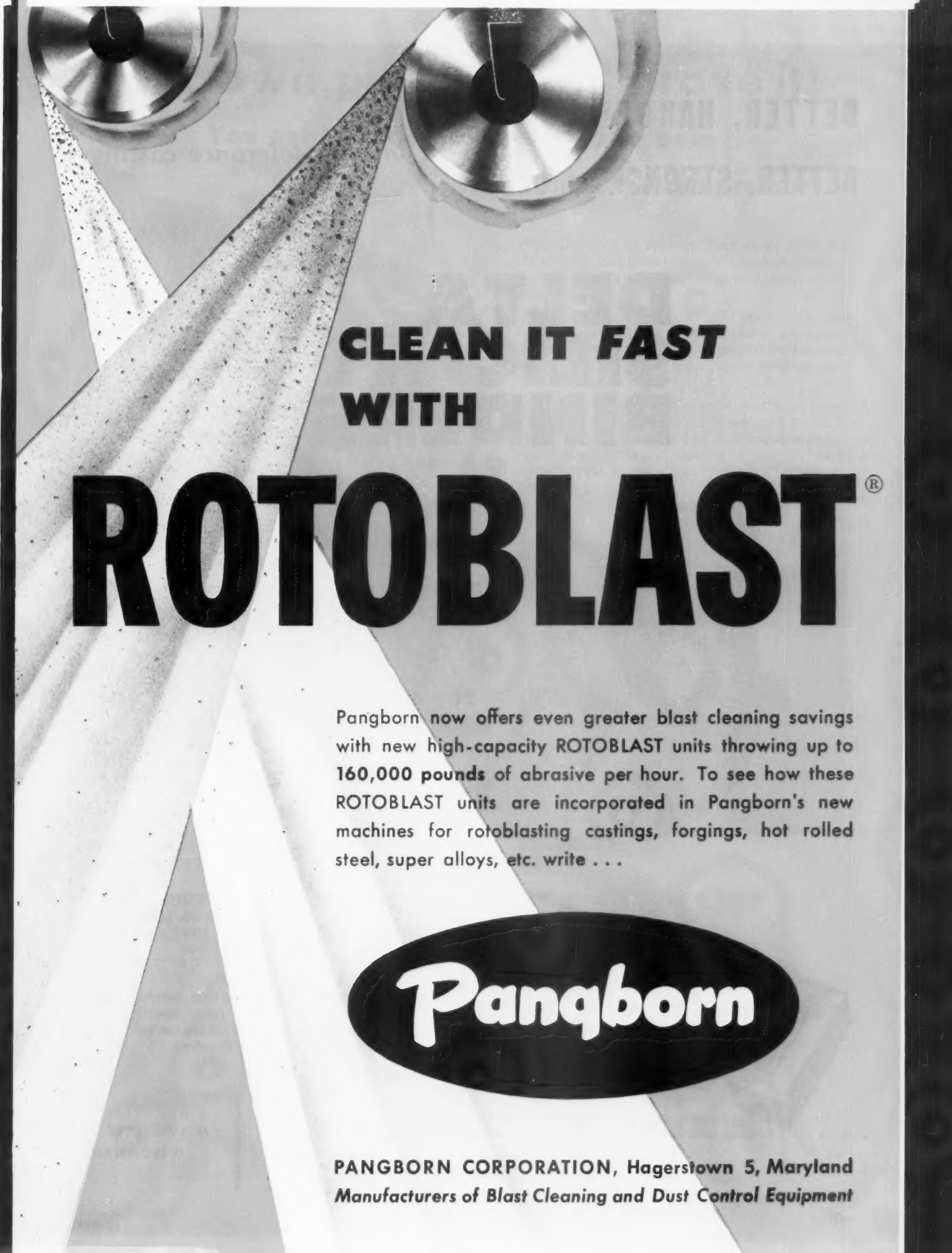
Industrialists all across America know that CCC is prominent in important plant installations of the post-war expansion era. They rely on the talents and techniques, the experienced supervision and precise organizing that CCC brings to every job. If your company is planning the removal, relocation or installation of machinery, turn the job over to CCC. Your project will be completed *quickly, economically* and *efficiently.*

CCC services, individually or under one Package Contract, include: Press Erecting • Rolling Mill Installation • Machinery Installation and Moving • Foundry Installations • Overhead Crane Installation • Mothballing.

Write for new illustrated brochure.

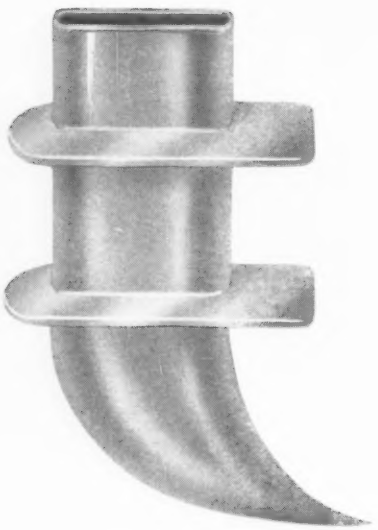
*COMMERCIAL CONTRACTING CORPORATION CCC COMMERCIAL CONTRACTING CORPORATION INDUSTRIAL INSTALLATIONS

12160 CLOVERDALE • DETROIT 4, MICHIGAN • TExas 4-7400


CLEAN IT FAST
WITH
ROTOBLAST®
Pangborn now offers even greater blast cleaning savings with new high-capacity ROTOBLAST units throwing up to 160,000 pounds of abrasive per hour. To see how these ROTOBLAST units are incorporated in Pangborn's new machines for rotoblasting castings, forgings, hot rolled steel, super alloys, etc. write . . .
Pangborn
PANGBORN CORPORATION, Hagerstown 5, Maryland
Manufacturers of Blast Cleaning and Dust Control Equipment

BETTER, HARDER CORES...
BETTER, STRONGER MOLDS...
for close-tolerance castings

DELTA SILICATE BINDERS



Delta Silicate Core and Mold Binders can be hardened by gassing with CO_2, warm air, nitrogen and other gaseous vapors and also by oven drying.

FOR CORES—

285XX Good shake out with low retained hot strength

299XX Excellent shake out with very low retained hot strength

FOR MOLDS—

270XX Fair shake out with high retained hot strength

292XX Poor shake out with maximum retained hot strength

When used as recommended, sands prepared with Delta Silicate Binders have excellent bench life and other unusual properties which are "exclusively Delta". When "set", molds and cores have the necessary strength to insure a high production rate.

If improved flowability and release properties are necessary with the use of any type of silicate binder, Delta Sand Conditioning Oil or Delta No. 298 Release Agent is recommended.

DELTA

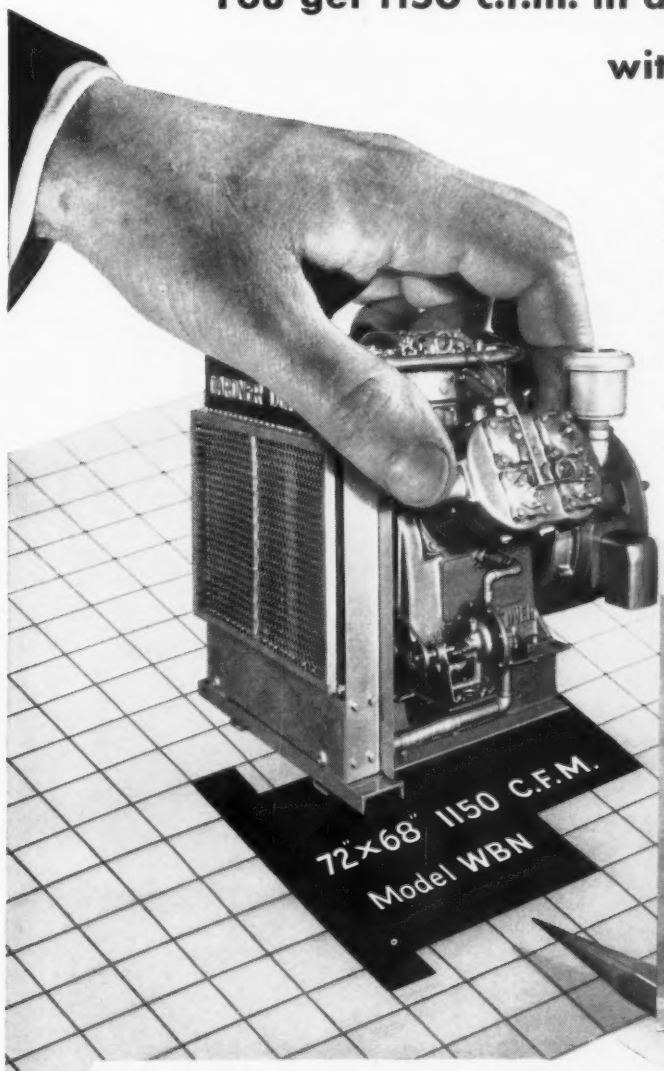
Get the facts... Working samples and complete literature on Delta Silicate Binders will be sent to you on request for test purposes in your own foundry.

DELTA OIL PRODUCTS CO.
MANUFACTURERS OF SCIENTIFICALLY CONTROLLED FOUNDRY PRODUCTS

MILWAUKEE 9, WISCONSIN

Your own plotting will prove it!

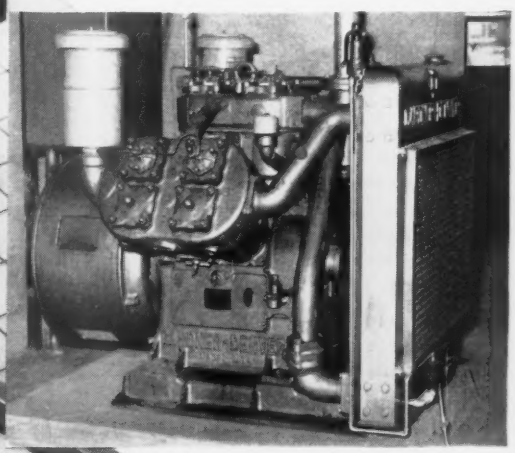
You get 1150 c.f.m. in a 72″ x 68″ space with this *new* compressor!



With the cost of factory floor space nudging the clouds, this new, compact Gardner-Denver packaged compressor is just what many plant planners want.

Occupying only 34 sq. ft. of space, this 200 h.p. unit rated 1150 c.f.m. In many instances, this volume is sufficient to permit retirement of two smaller units, with corresponding savings in space.

The new Model WBN needs no special base. You just bolt it down, hook up, and go. It is available with a self-contained radiator-intercooler that saves on cooling water, or with a tube-type intercooler. Write for complete details.



Eight capacities available . . . all space savers

Length	Width	c.f.m.	Model No.
39″	47″	142	WBR
40″	52″	194	WBE
49″	52″	285	WBQ
56″	56″	445	WBH
67″	67″	570	WBK
67″	67″	686	WBJ
72″	68″	1150	WBN

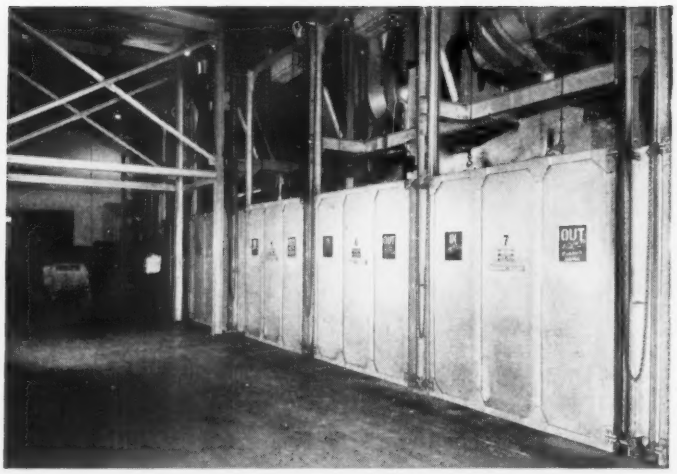
ENGINEERING FORESIGHT — PROVED ON THE JOB
IN GENERAL INDUSTRY, CONSTRUCTION, PETROLEUM AND MINING

GARDNER - DENVER

Gardner-Denver Company, Quincy, Illinois

In Canada: Gardner-Denver Company (Canada), Ltd., 14 Curity Ave., Toronto 16, Ontario

Circle 575 on Page 51



Coleman Transrack Ovens

How much money can you really save using

COLEMAN OVENS

in your core department?

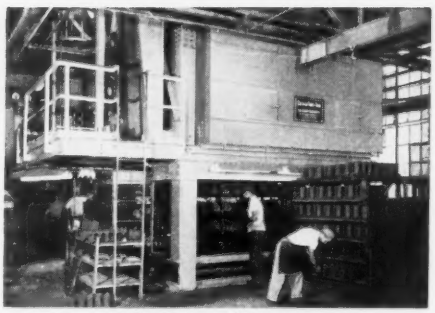
Performance records in all classes of foundries prove that Coleman Ovens reduce overall core department costs by as much as 50%! In fact, many Coleman Ovens pay for themselves out of savings in less than a year!

Coleman Core and Mold Ovens, through modern engineering and more than half a century of specialized foundry experience, have an outstanding record for reducing scrap losses, fuel, material and labor costs. The uniform heating, accurate controls and work handling methods found exclusively in Coleman Ovens are responsible for immediate improvement in cores, molds and casting quality.

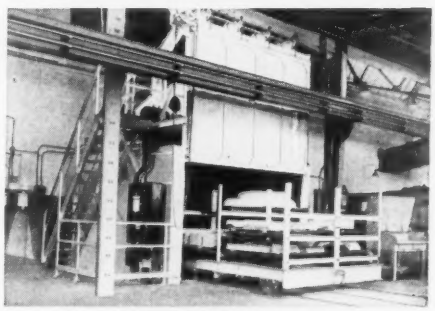
Since production savings are so important to profits, it will pay you to investigate the unusual advantages of Coleman Ovens immediately. Let our experienced engineers show you how modern Coleman Ovens can pay dividends in your foundry.

As builders of the world's only complete line of foundry ovens, we have no reason to recommend any but the best oven for your purpose.

WRITE FOR BULLETIN 54



Coleman Tower® Oven



Coleman Car-Type Oven

Coleman Dielectric Oven

A COMPLETE RANGE OF TYPES AND SIZES:

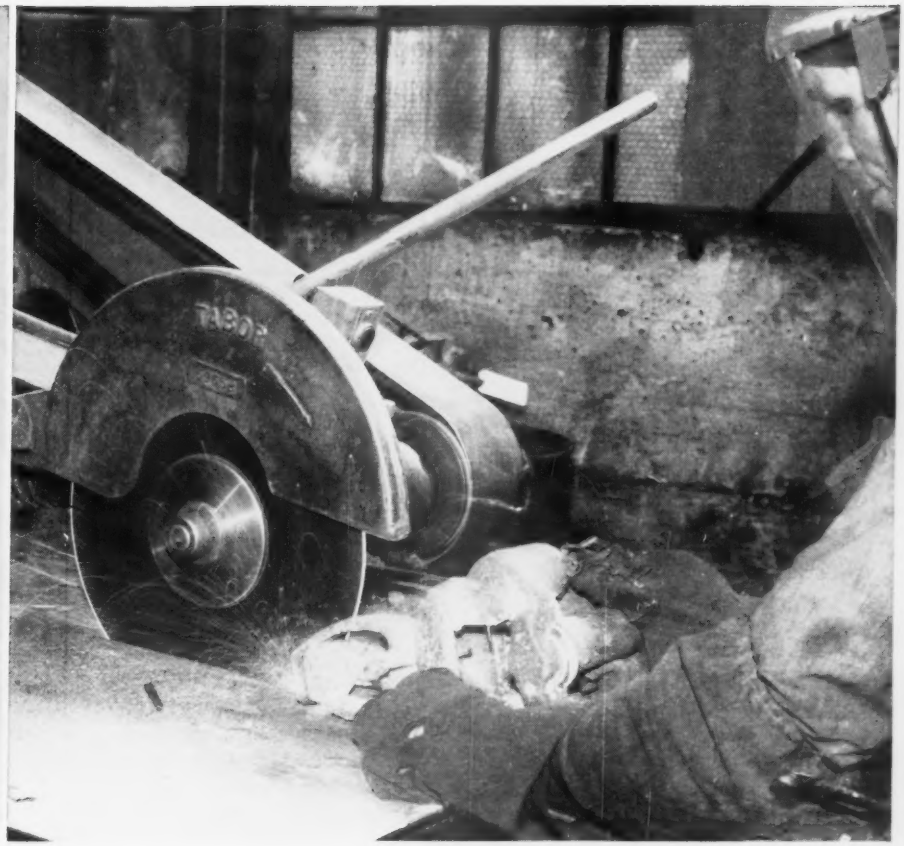
for every core baking and mold drying requirement:

Tower Ovens • Horizontal Conveyor Ovens • Car-Type Core Ovens • Car-Type Mold Ovens • Transrack Ovens • Rolling Drawer Ovens • Portable Core Ovens • Portable Mold Dryers • Dielectric Core Ovens

THE FOUNDRY EQUIPMENT COMPANY

1821 COLUMBUS ROAD CLEVELAND 13, OHIO

WORLD'S OLDEST AND LARGEST FOUNDRY OVEN SPECIALISTS



"More Use per Dollar" With MANHATTAN *Reinforced* CUT-OFF WHEELS

Actual field reports indicate up to 25% increase in cutting efficiency and cleaning-room production with Manhattan Reinforced Cut-Off Wheels . . . on stationary *and* swing-frame machines! *Built-in* reinforcement makes the difference . . . These wheels are reinforced *two ways* to take the abuse and strain of heavy cutting in foundry operations. First, the use of special fibers increases the strength of the wheel to withstand destruction from centrifugal force by 50%! Second, lateral wheel reinforcement by special super-strength industrial fabric gives resistance to side strain far beyond the ability of conventional cut-off wheels! They offer protection against breakage and provide a safe wheel for foundry use.

Engineered advantages of Manhattan Reinforced Cut-Off Wheels add up to safer, faster cutting and increased production . . . "More Use per Dollar" . . . in foundry operations. The same with Manhattan Snagging and Portable Wheels and Moldiscs; they also save you time and money on other specific metal-removing jobs! Ask a Manhattan sales engineer about Manhattan Reinforced Foundry Cut-Off Wheels and other types of high speed, heavy duty abrasive wheels for your needs.

RM-741

GRINDING WHEEL INSTITUTE MEMBER

WRITE TO THE ABRASIVE WHEEL DEPARTMENT

MANHATTAN RUBBER DIVISION—PASSAIC, NEW JERSEY

RAYBESTOS-MANHATTAN, INC.

Belts • Hose • Roll Covering • Tank Linings • Industrial Rubber Specialties • Abrasive and Diamond Wheels • Brake Blocks and Linings • Clutch Facings • Asbestos Textiles • Mechanical Packings • Engineered Plastics • Sintered Metal Products • Industrial Adhesives • Laundry Pads and Covers • Bowling Balls

Circle 577 on Page 51

43 U.S. FOUNDRIES NOW USE

52* NATIONAL SAND RECOVERY SYSTEMS

Most units have repaid owner's investment in *less than 2 years*

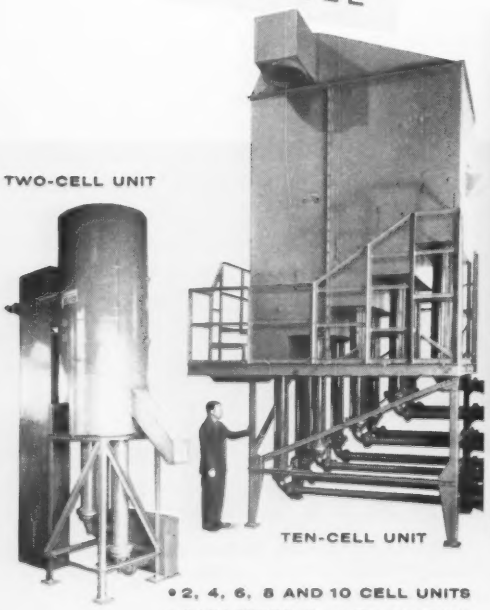
The map on the following page shows *52 reasons why* practical foundrymen come to National when their plans include sand reclamation equipment.

Since 1952—43 U.S. foundries have placed orders for 52 National Sand Recovery Systems. Most of these shops are now reaping financial reward from equipment that paid for itself in as little as two years time. Some are literally mining *profits* from used sand piles.

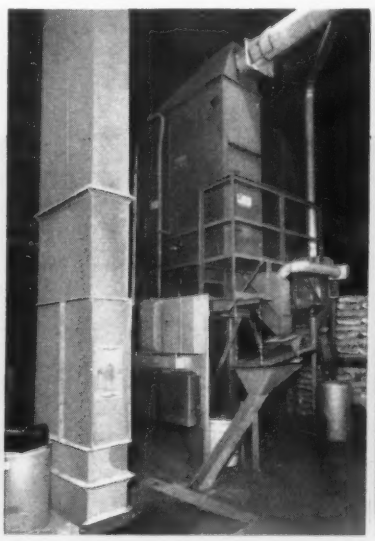
If *your* plans include sand reclamation, *proven performance* will stand high on your list for equipment consideration. Simplicity of operation and maintenance, proper capacity considerations and *experienced* assistance in incorporating sand reclamation equipment into your present sand handling system are of similar importance. All of these factors will be an *integral* part of your bid from National.

There's a National Sand Scrubber near you. Your National Agent can arrange an inspection visit. Why not call him or write for details?

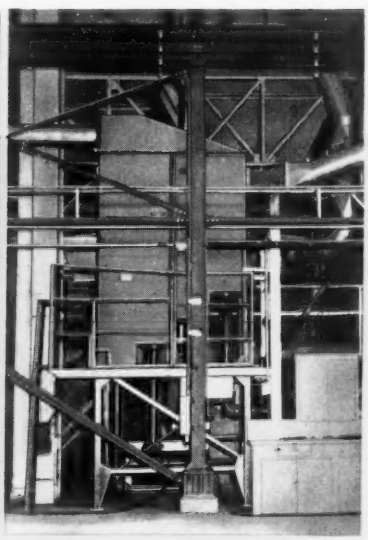
5 SIZES AVAILABLE



• 2, 4, 6, 8 AND 10 CELL UNITS
• CAPACITIES OF 1 TO 10 TONS PER HOUR

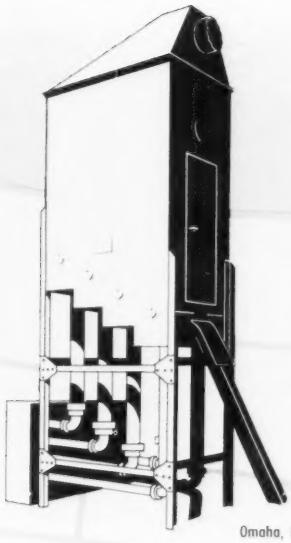


NO PITS OR FOUNDATIONS ARE NECESSARY



FITS EASILY INTO EXISTING SAND HANDLING SYSTEMS

Facts Speak Louder Than Words:



***KEY:**

- ● National units in operation
- ○ National units in design or erection

THESE FOUNDRIES ARE NOW USING NATIONAL SAND RECOVERY SYSTEMS:

Included are carbon and alloy steel foundries and grey iron shops

American Brake Shoe Co.
Atlas Foundry & Machine Company
Birdsboro Armorcast, Inc. (4 units)
Chapman Valve Company
Clark Equipment Company
Commercial Steel Castings Co.
Continental Foundry & Machine Co.
Crucible Steel Company
Deemer Steel Castings Co.
Dodge Steel Company
Duncan Foundry & Machine Company
Electric Steel Castings Co.
Fort Pitt Steel Castings Co.
General Steel Castings Co. (4 units)
Hanford Foundry
Kay Brunner Steel Products, Inc.
Kensington Steel Company
Locomotive Finished Materials Co. (2 units)
National Malleable & Steel Castings Co. (3 units)
Ohio Steel Foundry
Omaha Steel Foundry
Pacific Southern Foundry Company
Pacific Steel Castings Co.
Pittsburgh Steel Foundry Corp.
Pratt & Letchworth Co.
St. Louis Steel Castings Company
Sterling Foundry Company
Sterling Steel Casting Co.
Superior Foundry, Inc.
Texas Foundries, Inc.
Texas Steel Company
The Fahralloy Company
U. S. Steel Corporation
Utility Steel Foundry
Washington Iron Works
Westelectric Castings Co.

Units are in design or erection for:

Dayton Steel Foundry
Electro-Alloys Division American Brake Shoe
Ingersoll-Rand Company
Minneapolis Electric Steel Castings Co.
National Malleable & Steel Castings (2 units)
Scullin Steel Company

A PROVEN product of a practical foundryman

NATIONAL ENGINEERING COMPANY

646 Machinery Hall Building
Chicago 6, Illinois

Circle 578 on Page 51

19 YEARS OF TOP PERFORMANCE EARN CONTROLLERS "SECOND LIFE"

Even after years of service, these Foxboro instruments have no trouble holding cupola blast air at ±2% accuracy. High repeatability assures consistently uniform melts.

General Metals re-installs dependable Foxboro Air Weight Controllers in brand new foundry

When General Metals Corporation, Oakland, Calif., built its new multi-million dollar foundry, all major equipment was replaced. Everything, that is, except their Foxboro Air Weight Controllers. These instruments, installed in their old foundry back in 1938, were moved right along into the new plant.

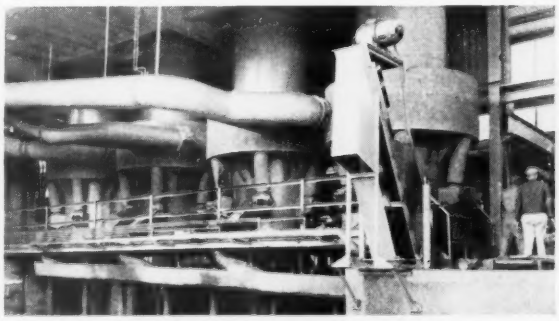
And with good reason, too. In 19 years of service the Controllers had never been taken off the line for maintenance or repair. The only attention they'd ever received was routine 6-month service check-ups.

In General Metals' new foundry, the Air Weight Controllers meter air to four #7 cupolas, holding it well within specified ±2% accuracy limits. And the Foundry Manager also reports that repeatability is practically perfect, giving him high uniformity in the quality of his gray iron.

You can keep the quality of *your* castings uniform with Foxboro Air Weight Controllers. Today's models are improved in design — even more in accurate performance. Find out about them by writing **The Foxboro Company, 3211 Neponset Ave., Foxboro, Mass.** Ask for Bulletin 10-10.

General Metals' new west coast foundry

Built in 1955 at a cost of 5 million dollars, it's one of the most modern and up-to-date on the West Coast. Foxboro Air Weight Controllers, 19 years old, performed so well they were re-installed in the new foundry.



Blast air to these four #7 Whiting cupolas is metered by Foxboro Controllers that have never been repaired — never taken out of service for maintenance.

FOXBORO REG. U.S. PAT. OFF **AIR WEIGHT CONTROLLERS**

Circle 579 on Page 51

Faster . . . Easier . . . Lower Cost

Cupola Lining Repairs with GUNPATCH

for gun application

GUNPATCH is a special siliceous mix prepared for air gun repairs to the melting zone of the cupola. Extremely high grade quartz pebbles and sized quartz sands constitute the major part of this mix. Selected plastic fire clays and other bonding agents are used to induce the cementing action that firmly holds the quartz pebbles in place until the high temperatures of the operating cupola develop the necessary ceramic bond that welds the applied mass into a strong, dense lining. Foundry operators report less rebound loss in application and less burn-out even in extremely high tonnage melting operations. GUNPATCH can be used with all types of standard gun equipment. It is shipped bulk or in 100 pound multiwall bags.

DAUBPAX for foundries not equipped with pneumatic guns

DAUBPAX . . . one refractory for every foundry refractory requirement . . . a complete foundry maintenance material. DAUBPAX is a superior bonded quartz ramming mix. It is a silica-base plastic material shipped in 100 pound cartons ready for immediate use. In addition to being excellent for patching cupola walls, DAUBPAX may be rammed into the bottoms and side walls of receiving and pouring ladles to form patches or complete linings. DAUBPAX is also available in dry form for mixing on the job. Shipped in 100 pound bags.

For further information and prices, just write our Sales Office at the

PYRO REFRACTORIES CO., P. O. Box 488, Oak Hill, Ohio

PYRO

REFRACTORIES COMPANY

Oak Hill, Ohio

- **Durex Refractories Co. Jackson, Ohio**
- **Portsmouth Clay Refractories Co. South Webster, Ohio**

Circle 580 on Page 51

for Sand . . .

For all the kinds of bulk materials you want to move, this "PAYLOADER" Model HA is probably big enough. It scoops up, transports and dumps up to a ton at a time. It carries its loads indoors or outdoors at speeds up to 10 miles per hour. It unloads boxcars of sand or fire clay, delivers its loads over bin or hopper edges up to 6½ feet high. It travels through doorways only 4½ feet wide — can handle more pounds per load and more loads per hour than bigger, heavier tractor-shovels.

The model HA features the famous Hough bucket action with 40 degree tip back at ground level giving low, close load-carry position for maximum capacity and stability.

If you do need a larger tractor-shovel than the model HA, there are five bigger "PAYLOADER" models from which to choose up to 9,000-pound load-carrying capacity. The Frank G. Hough Co., 703 Sunnyside Ave., Libertyville, Ill.

for Coke . . .

PAYLOADER®
MANUFACTURED BY
THE FRANK G. HOUGH CO. LIBERTYVILLE, ILL.
SUBSIDIARY—INTERNATIONAL HARVESTER COMPANY

11A-5a

for Scrap . . .

This basic model HA "PAYLOADER" is more than an efficient bulk-materials handling unit — it is also a floor sweeper, a load grapple, a pushing tractor, a snow plow, a fork lift . . . in fact, the most versatile and useful tractor-shovel any plant can own.

This multi-purpose usefulness is made possible by the many quickly-mounted attachments that are available to adapt this "PAYLOADER" to these many special tasks. Some of these attachments such as the pick-up floor sweeper, the load grapple and the "PAYHOPPER" are available only for "PAYLOADER" tractor-shovels.

Your nearby Hough Distributor, who sells and services "PAYLOADER" units is ready to demonstrate the profitable model HA. In the "Hough Purchase and Lease Plans" he also has a wide choice of financing arrangements to offer you. The Frank G. Hough Co., 703 Sunnyside Ave., Libertyville, Ill.

for Castings . . .

PAYLOADER®
MANUFACTURED BY
THE FRANK G. HOUGH CO. LIBERTYVILLE, ILL.
SUBSIDIARY—INTERNATIONAL HARVESTER COMPANY

11-A-5b

Late News

RESIN PRICES RISE: A 1 cent per pound increase in prices of all phenolic materials, including liquid, powdered, and lump resins, has been made by Bakelite Co., division of Union Carbide Corp., New York. A company spokesman stated that the price increase will assist in offsetting the cumulative increases in costs of raw materials, transportation, salaries, and other costs of doing business.

FEMA ELECTS: Gordon E. Seavoy, vice president, Whiting Corp., Harvey, Ill., was elected president of the Foundry Equipment Manufacturers Association at its 39th annual meeting, Oct. 17-19. Einar A. Borch, vice president, National Metal Abrasive Co., Cleveland, was elected vice president, and C. R. Heller was re-elected executive secretary-treasurer.

PLANS CAR WHEEL FOUNDRY: American Brake Shoe Co., New York, is planning construction of a new plant in Tonawanda, N. Y., to make cast steel railroad car wheels. Cost would exceed $6 million, and 150 employees would turn out about 100,000 wheels annually. The land has not been acquired as yet, but the site has been chosen. Brake Shoe acquired land for this same plant in Leroy, N. Y., more than a year ago, but has shelved that program.

GIFS OFFICERS: J. Scott Parrish Jr., president, Richmond Foundry & Mfg. Co., Richmond, Va., was re-elected president of the Gray Iron Founders' Society at its 29th annual meeting, Oct. 9-11. Also re-elected were A. M. Nutter, treasurer, E. L. LeBaron Foundry Co., Brockton, Mass., GIFS vice president, and A. H. Renfrow, general manager, Renfrow Foundry, Los Angeles, GIFS secretary. C. R. Garland, W. O. Larson Foundry Co., Grafton, Ohio, was named treasurer. New directors elected for three-year terms are W. G. Butler, accountant, Golden Foundry Co., Columbus, Ind.; R. Mayo Crawford, vice president, Turner & Seymour Mfg. Co., Torrington, Conn.; J. Douglas James, vice president-general manager, Urick Foundry Co., Erie, Pa.; and R. W. Wilder, secretary, Elkhart Foundry & Machine Co., Elkhart, Ind. D. H. Workman was reappointed executive vice president of the society.

PHILADELPHIA FOUNDRY COURSE: The Educational Committee of Philadelphia Chapter of AFS has scheduled a 16-week course in practical foundry study, beginning Nov. 18, at Murrell Dobbins Vocational Technical School. Classes will meet each Monday night from 7 to 10 p.m. Registration is Monday, Nov. 4, and Tuesday, Nov. 12, 7 to 9 p.m., at Room 106 of the school. Fees are $1 for registration and $2 for laboratory expenses. Scope of the course includes bench and floor green sand molding with various types of patterns; coremaking; and melting, pouring and handling of metal. The course is recommended for foundrymen who are not directly connected with molding or coremaking, yet require practical knowledge of how sand castings are made. It will be supplemented by plant visitations, lectures, films, and demonstrations.

PERSONALS: Frederic S. Claghorn has been appointed vice president in charge, Fletcher Foundry Div., Fletcher Works Inc., Philadelphia. Edward Oliver now is superintendent of the division . . . David T. Morgenthaler has been named president of Foundry Services Inc., Columbus, Ohio. He succeeds Eric Weiss, who will continue as board chairman . . . John R. Davis has been appointed southern representative, Machine Div., Osborn Mfg. Co., Cleveland, to serve Tennessee, Virginia, Alabama, Florida, Georgia, North and South Carolina, and Mississippi . . . Ralph E. Betterley has joined the AFS headquarters staff in Des Plaines, Ill., as training supervisor and education director . . . Richard B. Kropf has been appointed supervisor of development activities in the automotive industry for International Nickel Co., New York, succeeding E. J. Hergenroether, who has retired . . . Arnold J. Martin has been named vice president of Samuel Greenfield Co., Buffalo smelters and refiners . . . John W. Phillippe has been made Detroit district manager, covering Michigan,

for Acme Resin Corp., Forest Park, Ill. . . . Paul C. Holland has been appointed general manager of National Precision Casting Corp., Paoli, Pa., a subsidiary of Beryllium Corp., Reading, Pa.

PRIMARY ALUMINUM: Production of primary aluminum in the United States during September totaled 129,277 tons, slightly less than the 132,316 tons produced during the same month last year. The 1957 total through September is 1,239,010 tons, still a little ahead of 1956, when 1,236,650 tons were produced during the same period.

OBITUARY: John C. Dabney Jr., 68, retired vice president, secretary and treasurer, Glamorgan Pipe & Foundry Co., Lynchburg, Va., died Oct. 3 . . . Stanley B. Davies, 69, president, Royer Foundry & Machine Co., Kingston, Pa., died Sept. 27 . . . Raymond R. Howell, 68, retired secretary, Thiem Products Inc., Milwaukee, died Oct. 11 . . . Louis C. J. Weckerley, 86, president, Ferguson & Lange Foundries Inc., Chicago, died Oct. 18 . . . Dr. Paul D. Merica, 68, retired president, International Nickel Co. of Canada, died Oct. 20.

MISCELLANY: A $100,000 modernization program to speed up production of gray iron foundry molding has been instituted by Fletcher Foundry Div., Fletcher Works Inc., Philadelphia . . . A 350-lb capacity induction vacuum melting furnace, said to be the largest in the world, is in the final stages of installation at the Minerva, Ohio, works of Kolcast Industries Inc., an affiliate of Thompson Products Inc., Cleveland . . . Foundry Specialties Mfg. Co. has been formed in Milwaukee, and Badger Pattern Works Inc. has been organized in West Allis, Wis. . . . Wagner Mfg. Co., Sidney, Ohio, has acquired the household lines of Griswold Mfg. Co., Erie, Pa., and will operate this portion of its business as the Griswold Mfg. Co. Div. . . . Merger of Midland Steel Products Co., Cleveland, and J. O. Ross Engineering Corp., New York, has been approved by directors of both companies. After ratification of the merger by stockholders, the combined company will be known as Midland-Ross Corp. . . . Kaiser Alumium & Chemical Corp. has put a ninth potline in operation at its Chalmette, La., reduction plant, increasing its primary aluminum capacity by 27,500 tons annually, to a total of 247,500 tons.

Prices of Foundry Metals and Coke

(As of Oct. 28, 1957)

FOUNDRY COKE

(Per net ton, f.o.b. ovens)

BEEHIVE	
Connellsville	$18.00-18.50
OVEN	
Birmingham	$28.85
Buffalo	30.50
Detroit	30.50
Erie, Pa.	30.50
Indianapolis	29.75
Kearny, N. J.	29.75
Milwaukee	30.50
Montreal, Que.	31.00
Neville Island (Pittsburgh)	29.25
New England, deld.	31.55
Painesville, O.	30.50
Philadelphia	29.50
St. Louis	31.50
St. Paul	29.75
Swedeland, Pa.	29.50
Terre Haute, Ind.	29.75

PIG IRON

(Per gross ton f.o.b. furnace)

	No. 2 Foundry	Malleable
Birdsboro, Pa.	$68.50	$69.00
Birmingham	62.50	66.50
Buffalo	66.50	67.00
Chester, Pa.	67.00	67.50
Chicago	66.50	66.50
Cleveland	66.50	66.50
Duluth	66.50	66.50
Erie, Pa.	66.50	66.50
Everett, Mass.	68.00	68.50
Fontana, Calif.	75.50	....
Geneva, Utah	66.50	....
Granite City, Ill.	66.40	66.90
Neville Island (Pittsburgh)	66.50	66.50
Swedeland, Pa.	68.50	69.00
Toledo, O.	66.50	66.50
Troy, N. Y.	68.50	69.00
Youngstown, O.	....	66.50

NONFERROUS INGOT

(Cents per pound, carlots)

BRASS AND BRONZE: Red brass, No. 115, 27.75; tin bronze, No. 225, 36.00; No. 245, 30.25; high-leaded tin bronze, No. 305, 30.75; No. 1 yellow, No. 405, 22.00; manganese bronze, No. 421, 24.50.

ALUMINUM: 99 per cent plus primary ingots 28.10. Secondary No. 12 alloy, 21.75-23.00. Deoxidizing grades: No. 1, 23.75, No. 4, 19.00.

MAGNESIUM: 99.8 per cent notched ingots 36.00, f.o.b. Velasco, Tex. (10,000 lb or more).

COPPER: Electrolytic 27.00, delivered Connecticut valley.

ZINC: High grade 11.35 delivered. Die casting alloy No. 3, 14.25; No. 2, 15.25, delivered.

IRON AND STEEL SCRAP

(Consumer prices per gross ton delivered, except as otherwise noted)

	No. 1 Heavy Melting Steel	No. 1 Cupola Cast	Heavy Breakable Cast	Clean Auto Cast	Machinery Cast	Malleable	Short Steel Rails
Birmingham	$36.00-37.00	$47.00-48.00	.....	.....	.....	.....	$51.00-52.00
Boston*	**32.00-33.00	**33.00-34.00	.....	.....	**38.00-39.00	.....	.....
Buffalo	36.00-37.00	**43.00-44.00	.....	.....	**47.00-48.00	.....	55.00-56.00
Chicago	36.00-37.00	35.00-36.00	.....	40.00-41.00	40.00-41.00	47.00-48.00	51.00-53.00
Cincinnati*	**36.00-37.00	**36.00-37.00	**33.00-34.00	.....	**48.00-49.00	.....	**62.00-63.00
Cleveland	32.00-33.00	42.00-43.00	32.00-33.00	42.00-43.00	46.00-47.00	53.00-54.00	60.00-62.00
Detroit*	**26.00-27.00	**34.00	**28.00	**35.00	.....	**36.00	.....
Los Angeles	44.00	**54.00-56.00	.....	.....	.....	.....	.....
New York*	35.00-36.00	39.00-40.00	34.00-35.00	.....	.....	.....	.....
Philadelphia	37.00-39.00	43.00	42.00	.....	51.00-52.00	59.00	68.00-69.00
Pittsburgh	37.00-38.00	42.00-43.00	.....	45.00-46.00	54.00-55.00	.....	61.00-63.00
St. Louis*	39.00	45.00	37.00	46.00	.....	.....	59.00
San Francisco	39.00	50.00-52.00	40.00	50.00-52.00	50.00-52.00	.....	.....
Seattle	35.00	35.00	32.00	.....	.....	.....	.....

*Brokers' buying prices. **F.o.b. shipping point

WHITEHEAD'S
MOISTURE CONTROLLED
NATURAL BONDED
DORCHESTER MOLDING SANDS AND GRAVELS

Guaranteed Moisture Content Not More Than 6%

LEADER IN FOUNDRY SANDS SINCE 1841

These natural bonded sands and gravels are widely used for Molds and Cores in Iron, Steel, Alloy, and Non-Ferrous Castings. They are noted for colloidal clay giving high green and dry strength. Because of low fines in the grain distribution, these sands have high permeability. Here are advantages you may expect from Whitehead's Naturally Bonded Moisture Controlled Dorchester Sands and Gravels.

1 ***Moisture Controlled Sands Do Not Freeze—***

a. Easier to unload . . . means lower unloading costs.
b. Reduces handling costs to and from storage bins.

2 ***Moisture Controlled Sands Are Economical—***

a. Sands with 15% moisture have 1700 lbs. sand and 300 lbs. water in each ton.
b. Moisture Controlled Sands with 6% moisture have 1880 lbs. sand and 120 lbs. water in each ton.
c. On each ton of Moisture Controlled Sands you *SAVE price of sand and freight on 180 lbs. of water.* Sand has just proper amount of moisture to eliminate dust hazard.

3 ***Ready for Use on Arrival at Foundry—***

a. Dorchester Moisture Controlled Sands and Gravels arrive with proper working moisture content so that they can be used at once.
b. Aids you in control of sands in foundry.

Whitehead Brothers COMPANY

Established 1841

NEW YORK OFFICE
324 West 23rd St., New York 11, N. Y.

NEW ENGLAND OFFICE
17 Exchange Place, Providence 1, R. I.

Manufacturers of:

LYQUAGRIP
Ready-to-use core paste

DOB-IT
Ready-to-use core mudding compound

JOINT-SEAL
Plastic compound for perfect sealing

LYQUAFLOUR
For cleaner surface, better shakeout

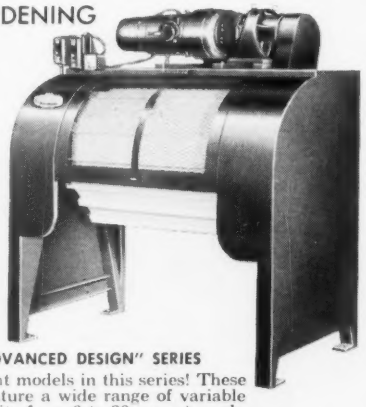
LYQUAFACE
The liquid sand grain coating

Circle 582 on Page 51

FOR DEBURRING • DESCALING • GRINDING • BURNISHING • POLISHING • FORMING RADII
MICROINCH FINISHING • RUST-INHIBITING • WORK-HARDENING

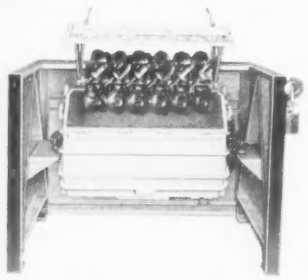
ALMCO

has the right barrel finishing equipment for you!



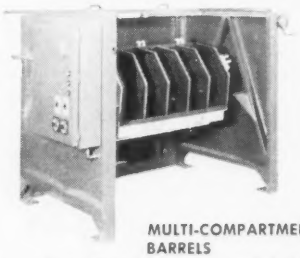
ALMCO'S "ADVANCED DESIGN" SERIES

Thirteen great models in this series! These machines feature a wide range of variable speeds (infinite from 6 to 30 r.p.m.), making possible economical deburring and finishing of the greatest variety of parts. Each unit has Almco's exclusive design features and rugged construction to stand up under all types of punishing applications.



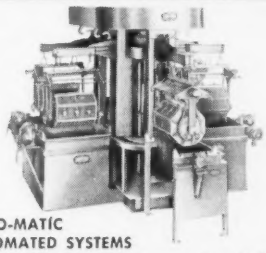
"FIXTURE" TYPE BARRELS

Pioneered by Almco for processing large and intricate parts. Custom designed fixtures hold parts securely, prevent part-on-part impingement and allow abrasive action to reach all surfaces, cavities, slots, etc. Barrels have automatic forward and reverse controls. Almco also offers integrated materials handling systems for further barrel finishing economies.



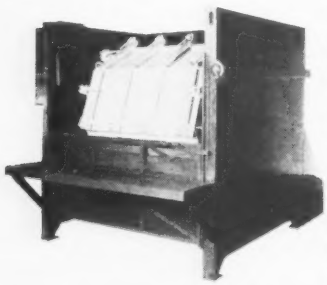
MULTI-COMPARTMENT BARRELS

Do you have these deburring and finishing problems — wide variety of parts or small quantity runs where fixtures would be too costly? Or short to medium cycle runs where you could *re-use* compound for several runs? Lack of floor space for several machines? An Almco custom-designed multi-compartment barrel may give you a cost-saving answer. Automatic forward and reverse. Any combination of compartments and doors.



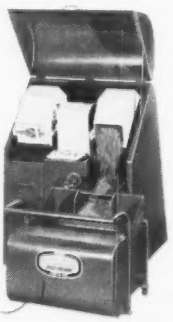
SUB-O-MATIC AUTOMATED SYSTEMS

Almco's exclusive submerged unit is an automatic, "assembly line" system for micro-precision deburring and finishing of small parts in quantity. Saves labor, speeds up processing and flow of high production parts. One man for example can operate this equipment and handle as many as 192 barrel loads per 16 hr. day. Slashes compound expense to minimum because compounds can be re-used for days at a time. These submerged systems can also be obtained in non-automated, straight line systems.



CUSTOM-DESIGNED BARRELS

Almco designs and manufactures special barrels of all types for problems where standard equipment cannot be effectively used. These range from the smallest type to the largest fixture barrel such as the 60" diameter x 60" length barrel shown above. Special large diameter barrels with double flat or triple flat doors are also available to accommodate extra large parts and to allow abrasive media to flow freely over the outer periphery of the part. Your special problems may be solved with one of Almco's custom-designed barrels. Material handling systems can also be closely coordinated with special barrels.



SMALLER MACHINES

Twin barrel machines manufactured by Almco are the standard of the industry for shops processing small lots of parts and for companies with large lots of small parts. Also ideal for sample processing, barrel finishing research and development work, and as auxiliary equipment. These units are Almco engineered to the highest specification standards and include operational and safety features found on larger Almco machines.

YOUR SAMPLE PARTS PROCESSED without obligation in this modern Almco test lab! Simply write on letterhead for address of nearest Almco lab or send parts direct to Albert Lea, Minn. Enclose specifications desired. Complete free report includes recommendation. 52 PAGE BARREL FINISHING HANDBOOK SENT ON REQUEST.

Almco deburring and finishing machines are ruggedly constructed to perform on a round-the-clock basis. They incorporate the best engineering design required in the industry — your assurance of versatility and economical processing of work parts. Optional equipment includes material handling devices and systems, automatic forward and reverse, double or triple flat doors, single and dual timer controls for automatic delay starting and stopping, perforated drain doors for flushing and rinsing, unloading devices, etc. Also a full and complete line of Almco Supersheen barrel finishing compounds and media of all types made especially for use with Almco precision barrel finishing equipment.

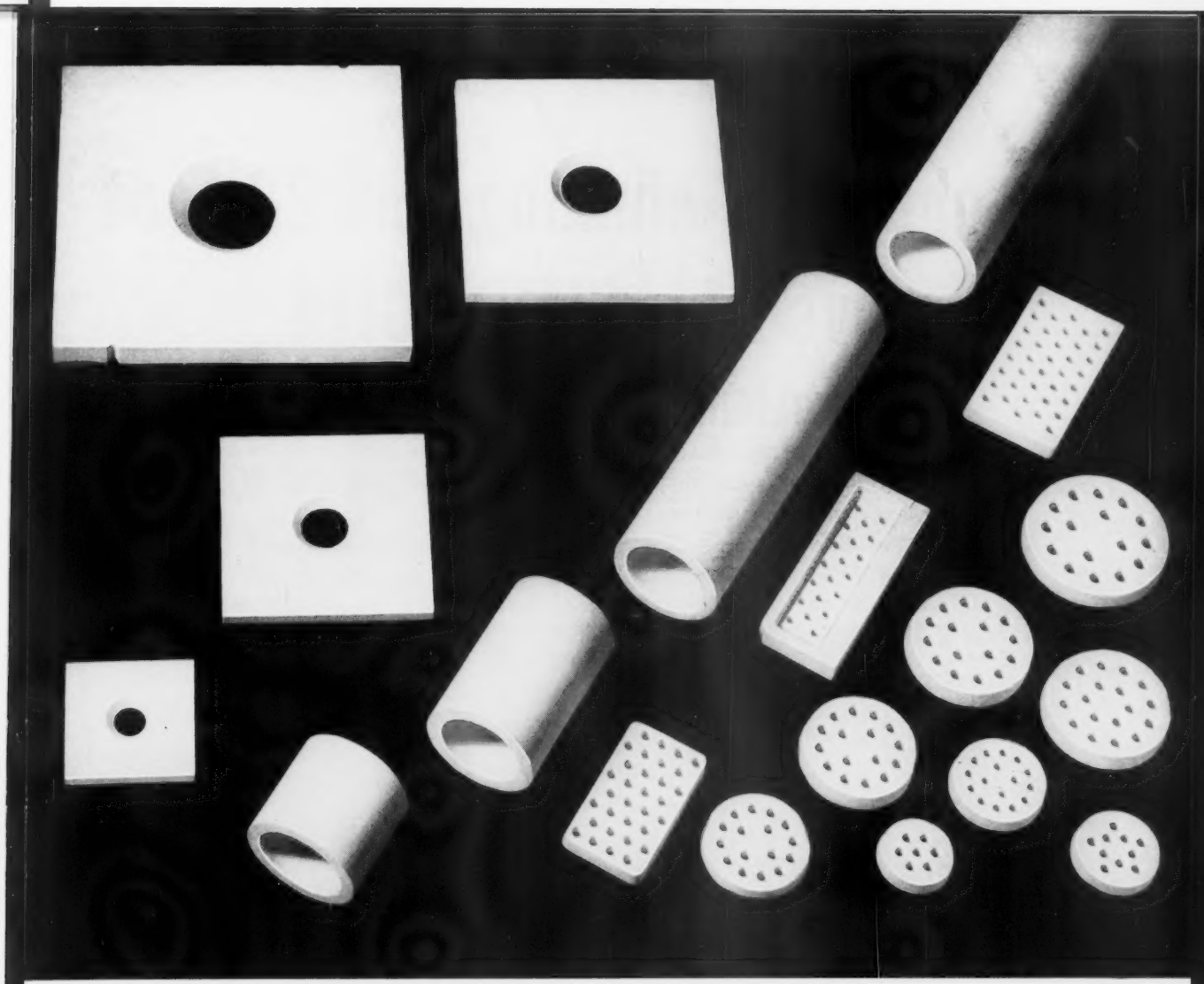
ALMCO

DIVISION OF QUEEN STOVE WORKS, INC.

1411 Marshall Street • Albert Lea, Minnesota

Sales and Engineering Offices in Chicago, Detroit, Los Angeles, Newark, New Haven, Philadelphia and London, England.

Designers and Builders of all types of Barrel Finishing Equipment for the Metalworking Industry



what do you need in **gating** and **risering** refractories?

To our customers in the foundry field this ad will come as *welcome news.* Louthan's line of production-proved refractories has been expanded to cover still more of your needs—help you save time and money on still more of your jobs.

Louthan Strainer Cores are now available in more sizes and shapes—and for *steel, iron, brass* and *bronze* castings. All provide an accurate choke for positive control of metal flow, eliminate slag and oxide inclusions.

Louthan Breaker Cores facilitate rapid removal of the riser with subsequent labor savings. There is no core gas. You get cleaner castings. Available for all riser diameters from 2″ to 12″, and for use with *any metal casting* risering from a flat surface.

Louthan Gate Tiles prevent erosion of the gates in steel castings. They safely withstand high temperatures, will not react with the molten metal. All popular diameters and lengths can be furnished.

So again we say, "What do *you* need?" *We have it!* If you haven't used Louthan Refractories, it will pay you to try them.

THE Louthan MANUFACTURING COMPANY

(A SUBSIDIARY OF FERRO CORPORATION) EAST LIVERPOOL, OHIO

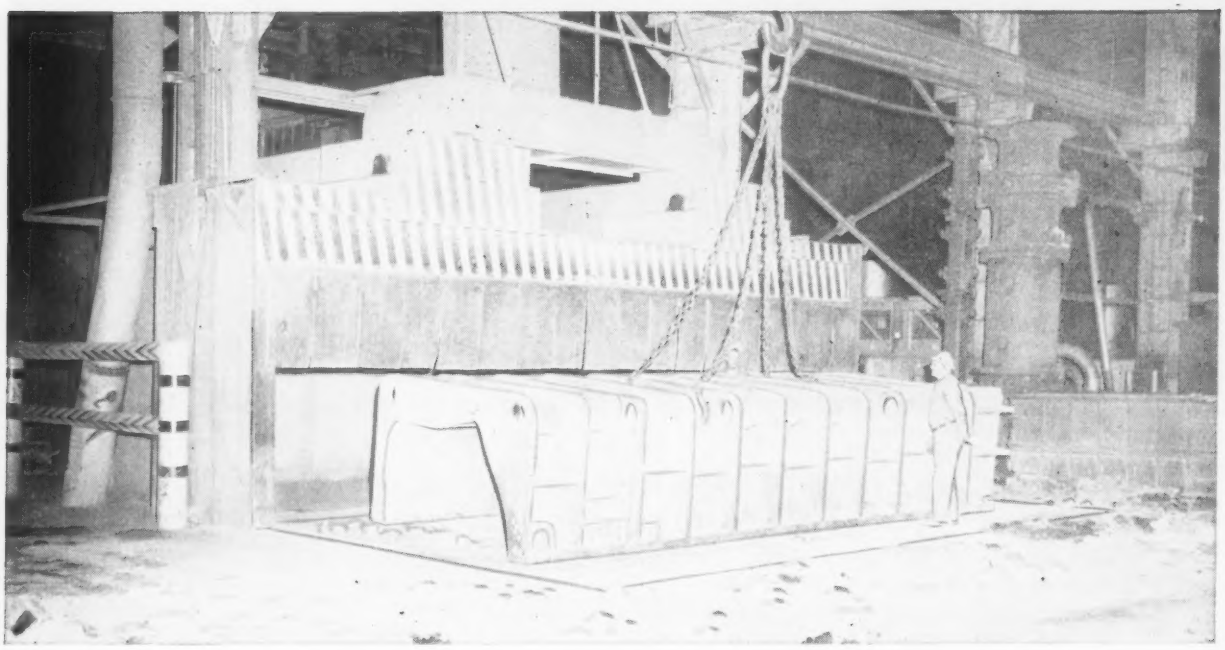
REPRESENTATIVES: M. A. BELL COMPANY, St. Louis 2, Mo. . . . Houston 3, Texas; **FOUNDRY SUPPLY COMPANY,** Minneapolis 16, Minn.; **MILWAUKEE CHAPLET & SUPPLY CORP.,** Milwaukee 46, Wisc. . . . **FREDERIC B. STEVENS INC.,** Detroit 16, Mich. . . . Indianapolis 7, Ind. . . . Buffalo, N. Y.; **MISSOURI REFRACTORIES COMPANY,** 4599 Pacific Blvd., Los Angeles 58, California

Circle 584 on Page 51

problem of shaking out 28-foot solved by SIMPLICITY

the problem: How to clean huge steel mill roll flasks.

- The Place?—The Ohio Steel Foundry Co., Lima, Ohio.
- Additional problems?—The size of the task! Roll flasks are as long as 28 feet—with copes and drags weighing up to 75 tons each with sand.
- What about sand lumps?—These are to be reduced to grain size, and removed to a sand reclaiming system.



The OS-A-VEYOR'S VERTICAL ACTION produces fast shakeout without travel of castings or flasks off of the machine deck. Adjustment can be made for extremely high speed travel, where desired.

flasks in Lima foundry

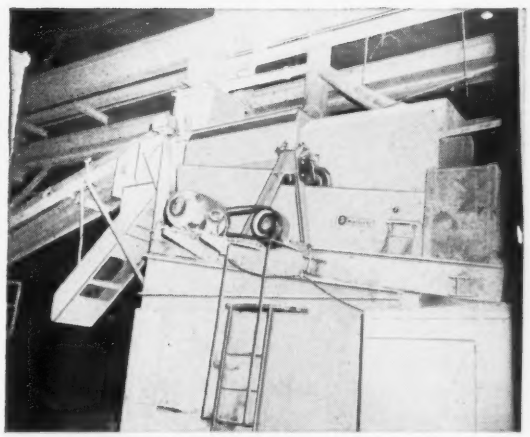
the solution:

Three 8′ 6″ x 12′ Simplicity spring-mounted, Vertical Action shakeouts installed side by side, with decks flush with the foundry floor—providing a shakeout area of 12′ x 26′. Just 2 minutes on the shakeout thoroughly cleans these flasks, where several hours were previously required to clean them manually.

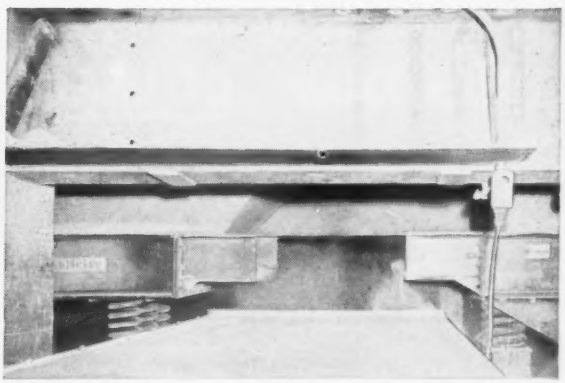
For handling the sand, four Simplicity Vibrating feeders were installed under the shakeouts, providing uniform feeding of the sand through the deck openings to a 3′ x 29′ Simplicity Positive Action vibrating conveyor. A belt conveyor then takes the sand above floor level to a Simplicity Ring Crusher Screen, which reduces the sand lumps to grain size. A bucket elevator then takes the sand to a dry-reclamation system.

A unique feature of this installation is the dust-collector system designed by Mr. James Gaffney, Plant Engineer at The Ohio Steel Foundry Co. The hood is automatically placed over the shakeout by means of an overhead track, with the dust being removed by an overhead duct and blower system. After cleaning, the hood retracts for easy removal of the flask.

For the solution to your shakeout and sand reclaiming problems write us today.



This enclosed 4′ x 12′ Model D Simplicity Ring Crusher Screen has two sets of free-turning crushing rings which reduce the sand lumps to grain size. Available in many sizes, these screens are real money savers!



The four feeders, shown above, receive the sand from six hoppers installed under the shakeout. The conveyor, with partial dust cover, runs perpendicular to the feeders' direction of flow.

SALES REPRESENTATIVES IN ALL PARTS OF THE U.S.A.

FOR CANADA: Simplicity Materials Handling Limited, Guelph, Ontario

FOR EXPORT: Brown and Sites 50 Church St., New York 7, N. Y.

Simplicity

TRADE MARK REGISTERED

ENGINEERING COMPANY • DURAND 7, MICHIGAN

19

Circle 585 on Page 51

AAF Type N ROTO-CLONE traps dust from sand conditioning systems

Dust from sand conditioning systems (which represents more than one-third of all dust generated in foundries) has been eliminated in 63 additional foundries during 1957 by AAF's Type N ROTO-CLONE. This acceptance is your guarantee that the wet-collecting Type N is the *right* unit for this heavy duty service.

The high cleaning efficiency of this hydrostatic precipitator results from the combined action of centrifugal force and the thorough intermixing of water and dust-laden air. There's no secondary dust problem either, and its compact design makes for important space savings.

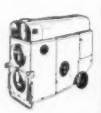
For complete information on the Type N ROTO-CLONE, call your local AAF representative or write direct for Bulletin 277.

AAF herman nelson

American Air Filter
COMPANY, INC.

266 Central Avenue, Louisville 8, Kentucky
American Air Filter of Canada, Ltd., Montreal 9, P. Q.

Herman Nelson Portable Heaters



Illinois Heating Specialties

— BETTER AIR IS OUR BUSINESS —

AAF Electric Furnace Hoods

AAF Type K Exhauster

Circle 586 on Page 51

In the most forward position

. . . Hannifin valves

Our "NE" valve—one of several Hannifin 4-way directional air control valves. Ask your Hannifin man when to use it.

Persistent research is bringing Hannifin valves to the most forward position in the field of pneumatic controls. These valves are opening up new areas of progress for sequential automatic production.

The Hannifin valves you buy today incorporate the very latest results of never-ending testing and development. Versatility of application and dependability of operation are winning them their position of leadership.

See your Hannifin man. Find out for yourself why Hannifin air control valves are so rapidly becoming first choice for automatic operation.

AIR CONTROL

HANNIFIN

VALVES

For this complete catalog showing all the Hannifin directional air control valves, write to Hannifin Corporation, 637 South Wolf Road, Des Plaines, Illinois.

Circle 587 on Page 51

Shown above is one of three albums we've assembled, containing hundreds of installation photos of Hines "POP-OFF" Flasks and Jackets in leading foundries around the world. In addition to pointing out the preference for Hines equipment, these photos give evidence that Hines has successfully designed and produced flasks for even the most difficult molding jobs — no matter what size or how complex.

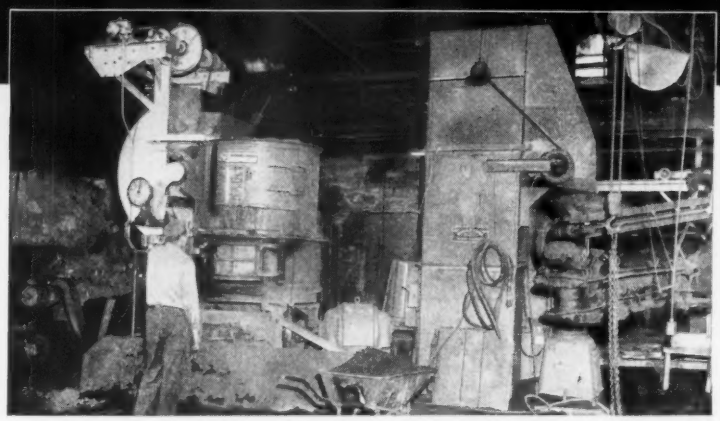
Cope and drag unit in malleable iron foundry using Hines Pop-off flasks. Molds placed on powered conveyor cars.

Checking through these albums and noting how Hines Flasks have done the job in other foundries might help solve *your* molding problems. Hines representatives have duplicate sets of albums and you are cordially invited to request seeing them. Just get in touch with your Hines representative or write or call us for other arrangements.

HINES POP-OFF FLASK FEMA

Circle 588 on Page 51

No. 2 in a Series: "Helping the Small Foundry Stay in Business"



Anstey's Key to Success!

PAY-AS-YOU-GO MECHANIZATION

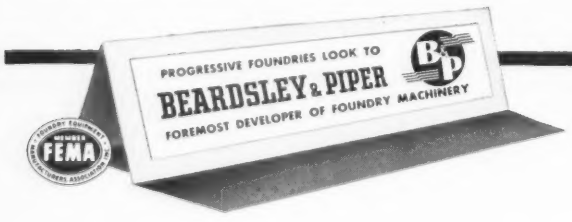
The hard facts of small foundry operation brought Tom Anstey, the young owner of Anstey Foundry, Stevensville, Michigan, to these conclusions:

1. *His small foundry, started in 1945 with just twelve men, was being squeezed between a highly competitive casting market and the high costs of labor and material.*
2. *The only way to escape the squeeze was to raise production without raising costs, or to cut costs while maintaining production.*
3. *Mechanization offered the only answer and "Pay-as-you-go" mechanization was the only kind his small shop could afford.*

Tom Anstey found the solution in a 1-2-3 B & P mechanization program. Step 1—the installation of a Stationary Sandslinger in August, 1953. Step 2—a Model "50A" Speedmullor in August, 1955, and Step 3—a "60" Preparator in October, 1956.

Each step completely paid for itself before the next step was undertaken. The results to date . . .

- √ *A 14% increase in production with costs actually reduced.*
- √ *47% of main molding bay crew released for other work.*
- √ *A one-man controlled sand operation replacing a four-man uncontrolled operation.*



Want more information? Write today. There's no obligation —we want to help. Beardsley & Piper, Div. Pettibone Mulliken Corporation, 2424 N. Cicero Ave., Chicago 39, Ill.

MAKE CUPOLA ADDITIONS FAST...EASY...ACCURATE

with "EM" Ferro-Alloy Briquets

FOUR KINDS of "EM" briquets are available for cupola additions: Chromium, Ferromanganese, Silicomanganese, and Silicon.

Three types of shipment are offered to meet the varied needs of the foundry industry: packed on pallets, packed in 250-lb. bags, or bulk.

Pallets facilitate handling, storage, and inventory control, and can be moved either by lift truck or overhead crane.

To aid in control of composition, each "EM" briquet contains a definite weight of alloying metal and is designed to minimize oxidation loss.

For further information on how "EM" briquets can help you, contact the ELECTROMET office in your area. Ask for booklet "Briquetted Alloys for the Iron Foundry Industry."

Write ELECTRO METALLURGICAL COMPANY, Division of Union Carbide Corporation, 30 E. 42nd Street, New York 17, N. Y. *Offices:* Birmingham, Chicago, Cleveland, Detroit, Houston, Los Angeles, Phillipsburg, N. J., Pittsburgh, San Francisco. *In Canada:* Electro Metallurgical Company, Division of Union Carbide Canada Limited, Toronto.

METALS DO MORE ALL THE TIME ...THANKS TO ALLOYS

Electromet
FERRO-ALLOYS AND METALS

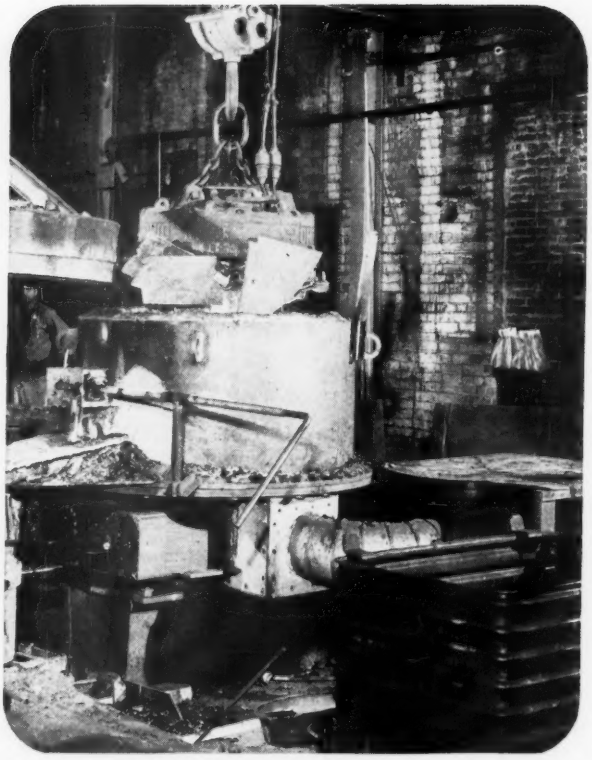
UNION CARBIDE

"EM" briquets contain exact weights of the alloying elements and thus make exact cupola additions easy.

The terms "Electromet" and "EM" are registered trade-marks of Union Carbide Corporation.

Circle 590 on Page 51

5 ways to make your foundry more efficient with OHIO MAGNETS

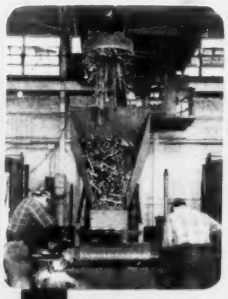


1 CHARGING FURNACE. One 36-inch Ohio Bolted Magnet charges six 375 KW furnaces giving 240 500-pound heats each 24 hours.

2 SCRAP HANDLING. All scrap is handled efficiently, economically with Ohio Magnet. Single 36-inch magnet replaces grapple, clamshell, bucket or lift truck.

3 SORTING. Castings are conveyed from Wheelabrator to hard-iron inspection. Ohio Magnet picks parts out of sorting bins.

4 UNLOADING ANNEALING FURNACE now takes one man 10 to 20 minutes with Ohio Magnet. Lift truck used to take 1 to 2 hours.



5 LOADING GRINDING HOPPER after conveying parts from inspection department. Same Ohio Magnet is used for operations shown in photos 3, 4 and 5.

Photos: Courtesy I-F Manufacturing Company, New Philadelphia, Ohio

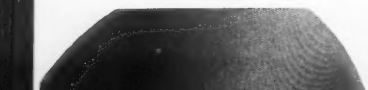
Ohio ELECTRIC

CHESTER BLAND
President

Small foundry or large, magnetic materials handling points the way to higher productivity, higher efficiency. And with Ohio Magnets on the job you get high availability, too. That's because Ohio Magnets are built with that extra margin of safety that means long, service-free life. Yes, *magnetic materials handling pays—especially with Ohio Magnets.*

THE OHIO ELECTRIC MFG. CO.
5400 Dunham Road • Maple Heights • Ohio

AA 8858



NEW CUT-OFF WHEEL

Save Time, Maintenance and Money In Your Metal-Melting . . .

Specify Norton Refractory Cements

FOR FERROUS METAL-MELTING

type of equipment	metals melted	use of cement	Norton cement recommended			how applied
			number	maturing temperature		
indirect arc	alloy iron and steels	lining	RA 1307	1150°C	2100°F	rammed
		patching	RA 1307 RA 1162	1150°C 1000°C	2100°F 1850°F	rammed rammed
direct arc	alloy steel and malleable iron	troweling around electrodes	RA 1162	1000°C	1850°F	trowled
		lining roof and around electrodes	RA 1307	1150°C	2100°F	rammed
high frequency induction	stainless steel and refractory alloys	lining	RM 1170	1150°C	2100°F	rammed (dry)
		patching large furnaces	RM 1152	1200°C	2200°F	rammed
		patching small furnaces	RM 1992	1100°C	2000°F	troweled or rammed
ladles	iron and steel	lining	RA 1307	1150°C	2100°F	rammed

FOR NONFERROUS METAL-MELTING

low frequency induction	Al, Te, Si bronzes	lining	RM 1140	1250°C	2300°F	rammed
	general purposes	lining	RA 1307	1150°C	2100°F	rammed
indirect arc	brasses and bronzes	lining and patching	RA 1307	1150°C	2100°F	rammed
crucible melting furnaces ■	brasses and bronzes	lining and patching	RC 1188	1100°C	2000°F	rammed
reverberatory furnaces ▲	brasses and bronzes	lining and patching	RC 1188	1100°C	2000°F	rammed

■ Cement not in contact with metal; used in combustion chamber. ▲ Cement in contact with metal.

Norton ALUNDUM* fused alumina (RA), CRYSTOLON* silicon carbide (RC) and MAGNORITE* fused magnesia (RM) cements are stable and very refractory. Carefully blended to assure proper grain size distribution, they are excellent for the widest range of operations.

For complete facts as to the nature and selection of these *engineered and prescribed* Norton Rx's, contact your Norton Representative. He'll supply you with the booklet *Norton Refractory Cements.* Or write for your free copy to NORTON COMPANY, Refractories Division, 310 New Bond Street, Worcester 6, Mass.

*Trade-Marks Reg. U. S. Pat. Off. and Foreign Countries

NORTON
REFRACTORIES
Engineered . . . Rx . . . Prescribed
Making better products . . . to make your products better
NORTON PRODUCTS: Refractories • Abrasives Grinding Wheels • Grinding Machines
BEHR-MANNING DIVISION PRODUCTS: Coated Abrasives Sharpening Stones • Behr-cat Tapes

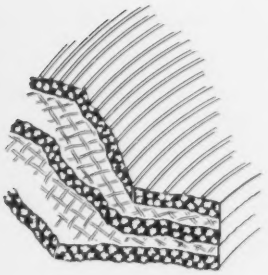
Circle 592 on Page 51

AVERAGES 33% LONGER LIFE!

NEW CUT-OFF WHEEL

AVERAGES 33% LONGER LIFE!

The records being set for all-round cutting efficiency by Bay State's new BZ2AA cut-off wheel are the results of careful and continuous research.



Cut-away wheel section showing reinforcement between layers of bonded abrasive.

Modern cut-off operations involve tremendous speeds, pressures and temperatures. If one of the three major cut-off wheel components . . . abrasive, bond or reinforcement . . . wears at a different rate from the others, cutting efficiency and wheel life fall off drastically. In the BZ2AA, Bay State has developed a new method of controlling these wear rates through the use of an improved bond. Now the three components are more perfectly matched, resulting in peak grinding efficiency.

In controlled laboratory tests the new BZ2AA wheel lasted an average 33% longer than the runner-up, Bay State's BZ2. Below are results of two such tests. They are typical of hundreds which have been confirmed in cutting gates and risers in leading foundries across the country.

Test #104 – Dry cutting cold rolled steel 1" square.
Wheel size: 16 x ⅛ x 1

	No. of cuts per wheel	
	BZ2	BZ2AA
	156	228
	157	193
	161	210
Total cuts	474	631
Average	158	210

Result: 33% more cuts per wheel with BZ2AA

Test #210 – Dry cutting cold rolled steel 1½" round.
Wheel size: 16 x ⅛ x 1

	No. of cuts per wheel	
	BZ2	BZ2AA
	58	71
	57	82
Total cuts	115	153
Average	57.5	76.5

Result: 33% more cuts per wheel with BZ2AA

The best proof of the BZ2AA's superiority is a test in your own cleaning room. Your Bay State representative will welcome the opportunity to arrange for such a test.

Write for descriptive sheet with full information.

BAY STATE ABRASIVES

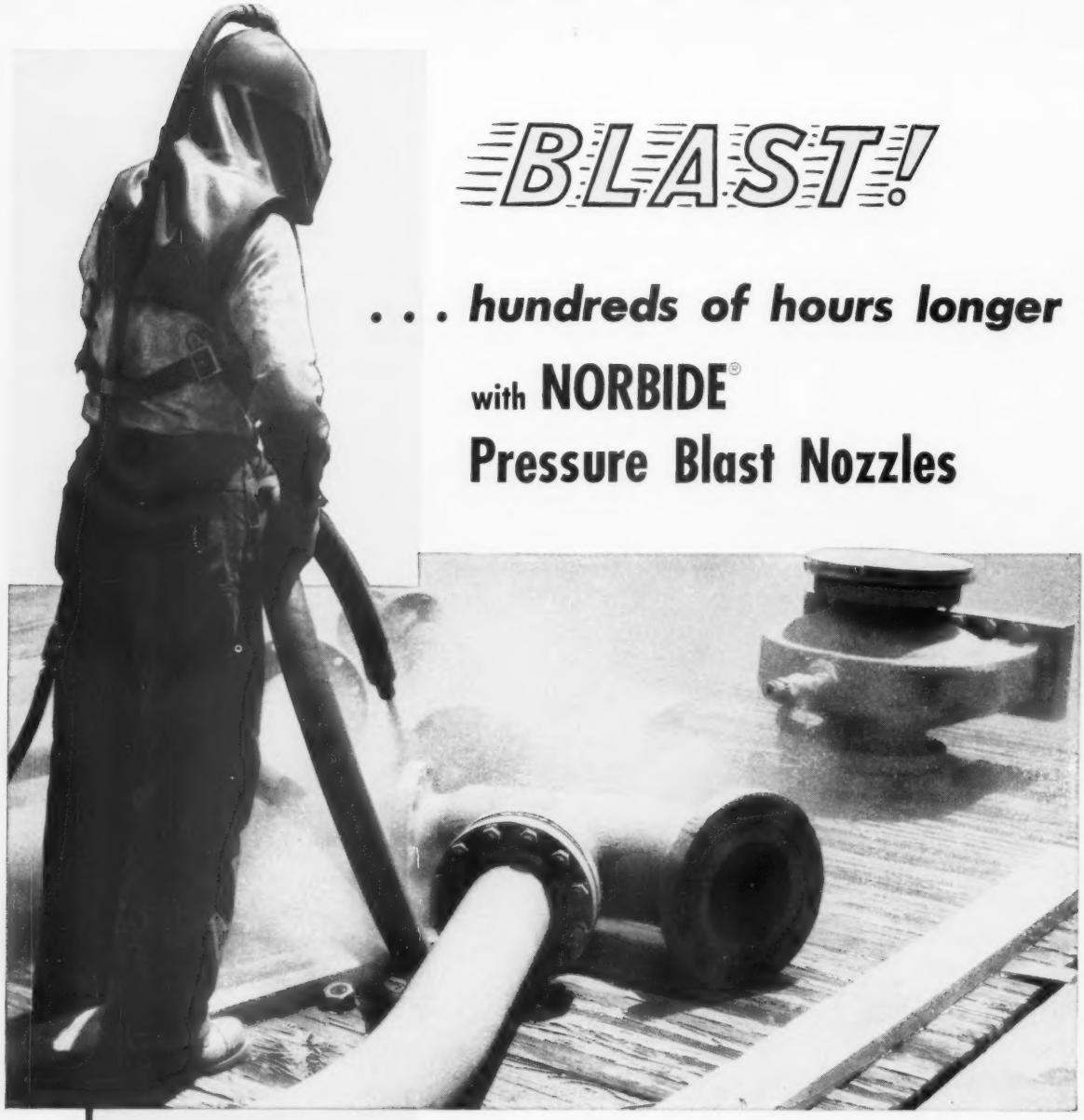
BAY STATE ® WHEELS of PROGRESS

Bay State Abrasive Products Co., Westboro, Mass.
Branch Offices and Warehouses: Bristol, Conn., Chicago, Cleveland, Detroit, Pittsburgh.
Distributors: All principal cities. Bay State Abrasive Products Co. (Canada) Ltd., Brantford, Ontario.

Circle 593 on Page 51

Reader

FOUNDRY



BLAST!

. . . hundreds of hours longer with NORBIDE® Pressure Blast Nozzles

NORTON®
BORON CARBIDE

Making better products . . . to make your products better

NORTON PRODUCTS
Refractories • Abrasives
Grinding Wheels • Grinding Machines
BEHR-MANNING DIVISION
Coated Abrasives • Sharpening Stones
Behr-cat Tapes

NORBIDE Pressure Blast Nozzles outwear any other type . . . 750 hours using silica sand . . . 1500 hours using steel shot or grit . . . air consumption decreased from 10 to 20 percent . . . stream contour and abrasive velocity maintained. For you, this means more service per dollar. For full details on cost-cutting NORBIDE Nozzles, write for your free copy of Form 543.

NORTON COMPANY
43 New Bond St., Worcester 6, Mass.

NORBIDE . . . *The Longest Nozzle Life You Can Buy*

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FURTHER INFORMATION on Advertised Products ?

November 1957

SIMPLY CIRCLE AD ITEM NUMBER BELOW

521	536	551	566	581	596	611	626
522	537	552	567	582	597	612	627
523	538	553	568	583	598	613	628
524	539	554	569	584	599	614	629
525	540	555	570	585	600	615	630
526	541	556	571	586	601	616	631
527	542	557	572	587	602	617	632
528	543	558	573	588	603	618	633
529	544	559	574	589	604	619	634
530	545	560	575	590	605	620	635
531	546	561	576	591	606	621	636
532	547	562	577	592	607	622	637
533	548	563	578	593	608	623	638
534	549	564	579	594	609	624	639
535	550	565	580	595	610	625	640
641	656	671	686	701	716	731	746
642	657	672	687	702	717	732	747
643	658	673	688	703	718	733	748
644	659	674	689	704	719	734	749
645	660	675	690	705	720	735	750
646	661	676	691	706	721	736	751
647	662	677	692	707	722	737	752
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649	664	679	694	709	724	739	754
650	665	680	695	710	725	740	755
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764	779	794	809	824	839	854	869
765	780	795	810	825	840	855	870
766	781	796	811	826	841	856	871
767	782	797	812	827	842	857	872
768	783	798	813	828	843	858	873
769	784	799	814	829	844	859	874
770	785	800	815	830	845	860	875
771	786	801	816	831	846	861	876
772	787	802	817	832	847	862	877
773	788	803	818	833	848	863	878
774	789	804	819	834	849	864	879
775	790	805	820	835	850	865	880

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770	785	800	815	830	845	860	875
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PRODUCT MANUFACTURED .....

the engineering excellence

FOUNDRY

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FIRST CLASS
Permit No. 36
CLEVELAND, OHIO

BUSINESS REPLY CARD
No Postage Stamp Necessary if Mailed in the United States

—4c POSTAGE WILL BE PAID BY—

FOUNDRY
Penton Building
Cleveland 13, Ohio

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FIRST CLASS
Permit No. 36
CLEVELAND, OHIO

BUSINESS REPLY CARD
No Postage Stamp Necessary if Mailed in the United States

—4c POSTAGE WILL BE PAID BY—

FOUNDRY
Penton Building
Cleveland 13, Ohio

Reader's Service Dept.

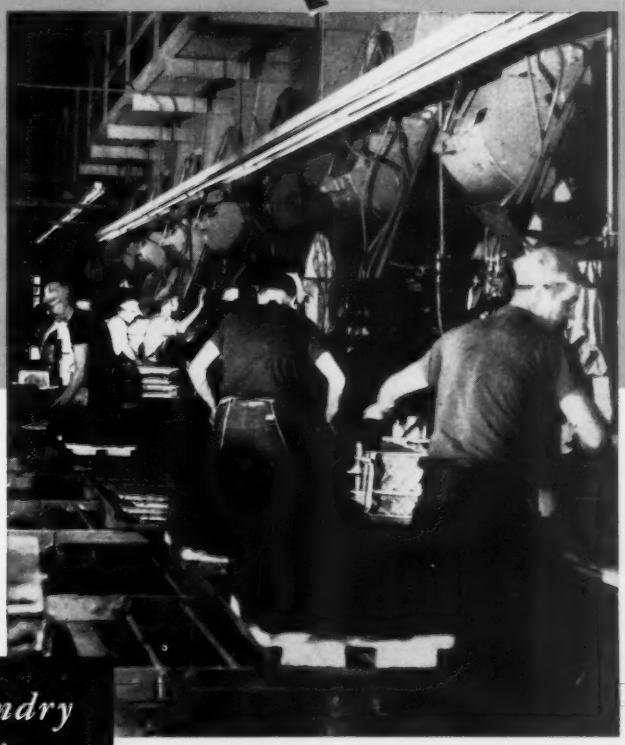
the engineering excellence

that gave you HANDY SANDY and REDDY SANDY...

put the cost of sand conditioning and handling into a nose-dive for plants using this unique equipment. Without shoveling of any type, the Reddy Sandy separates sand from castings and cores and prepares it for the molder. Handy Sandy puts the sand overhead where it is available to the molder without effort. 30% to 70% production increases are commonplace. This same engineering excellence

U. S. FOUNDRY CO.
MILWAUKEE, WISCONSIN

...gives you better sand handling systems too



Complete Newaygo Sand Handling Systems exemplify this same type of creative engineering that lowers costs for you. They help produce more work from every foot of floor space and often eliminate several unnecessary operations that add to the cost of your castings but not to their quality. Newaygo systems take less time to install and erect as every unit is pre-assembled at the factory to save you time and money.

Formerly "The shovel gang," these 14 molders at Auburn Foundry, Inc. now spend a maximum amount of time preparing molds, and with less fatigue. Note air operated gates on hoppers that further eliminate effort on the molder's part. Cope and drag setups on system allow molds up to 30" x 33" to be produced.

Hoppers and conveyor service walkway are supported from overhead building steel structure. This feature gives unobstructed working area under hoppers and around molding machines.

Molds are handled on pallet cars through the mold storage and pour-off area. They are automatically dumped at end of lines into a vibrating pan conveyor. Pallet cars and boards are returned automatically to molder on an underneath track system.

"Foundry Business is BIG Business"

NEWAYGO engineering company
NEWAYGO, MICHIGAN

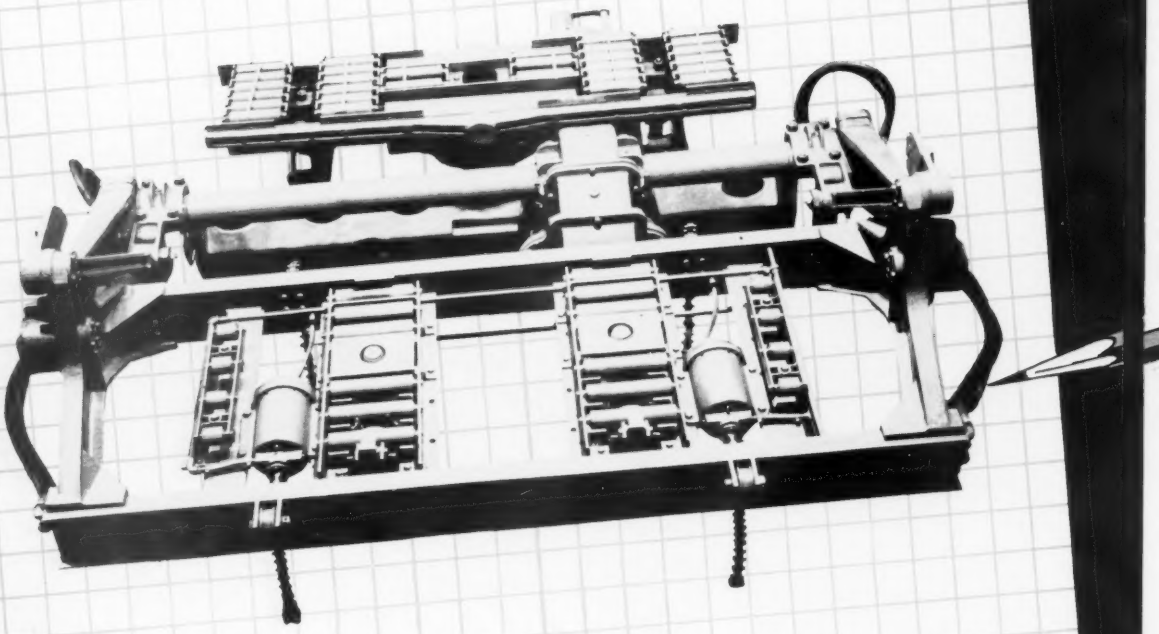
...and profitable too, with NEWAY® MOLD HANDLING, SAND HANDLING AND CONDITIONING EQUIPMENT

Circle 595 on Page 51

ninth of a series

HERMAN

Charging Conveyor Machine



IDEAL
for short-run work

HERMAN PNEUMATIC MACHINE CO., UNION BANK BUILDING, PITTSBURGH 22, PA.

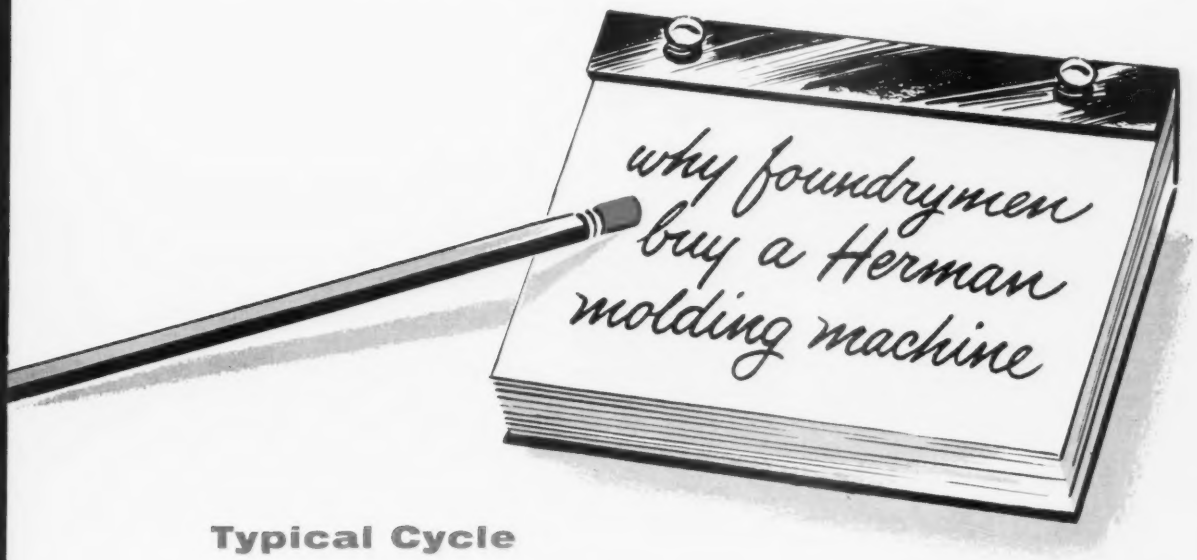
ninth of a series

If your type of work calls for short runs, the Herman Charging Conveyor Rollover and Draw Machine is the modern, economical answer.

Its extreme flexibility, *on either cores or molds,* makes it possible to produce a tremendous range of sizes and types of work.

This comparatively new machine in the HERMAN line is already being widely used in the foundry industry. Foundrymen choose it because it's versatile and operates equally well with either a Jolt Machine or Sandslinger.

It is produced in our broad range from 500 to 20,000 lb. rollover capacities.



Typical Cycle

1. Core box filled with sand and placed on the jolt unit.
2. Power lift conveyor lowers box on sub-plate.
3. Core box is jarred and elevated by power lift conveyor to standard conveyor level.
4. Box goes to Charging Conveyor Rollover and Draw Machine, manually or by pusher mechanism.
5. Pneumatic core box and core plate clamps engage rammed core box for rollover operation.
6. After rollover, core clamps are disengaged and slow draw operation starts.
7. Vibrators separate bond between core box and sand.
8. Fast draw operation checked by speed control device and core box gently deposited directly on discharge conveyor and rolled away on companion conveyor.
9. Inverted turnover plate and core box rolled back to upright position, pneumatic clamps disengaged and box returned to either jolt station or storage.
10. Another rammed core box should, of course, now be at the Charging Conveyor Rollover and Draw Machine for the production of another core.

FOUNDRY EQUIPMENT MANUFACTURERS ASSOCIATION INC. MEMBER FEMA

HERMAN

Best Known Name in Molding Machines

Circle 596 on Page 51

SHELL MOLDERS:
Get closer tolerances with
DOW CORNING 8 EMULSION
(SILICONE PARTING AGENT)

Metal castings just naturally require less machining and you produce fewer rejects when the sand shells and shell cores are held to closer tolerances. And that's where Dow Corning 8 Emulsion release agent really makes a big difference!

Unlike organic parting agents, the silicones in Dow Corning 8 won't decompose and build up on molds. Patterns stay clean cycle after cycle and give long runs of high precision sand shells and shell cores.

You reduce cleaning schedules and practically eliminate "stickers" when you use water-dilutable Dow Corning 8 silicone emulsion for your parting agent.

8 reasons why . . .

LEADING SHELL MOLDERS PREFER DOW CORNING 8 EMULSION

• quick, easy release • easy to apply — faster wetting action • economical in extremely low concentrations • resists creaming or separation • minimum build-up — closer tolerance shells • stepped-up production — maximum number of shells between pattern cleanings • nonflammable • fast delivery from centrally located warehouses.

To get a generous Free Sample and new "how to do it" brochure on "Shell Molding with Silicones" Address Dept. 5923

first in silicones

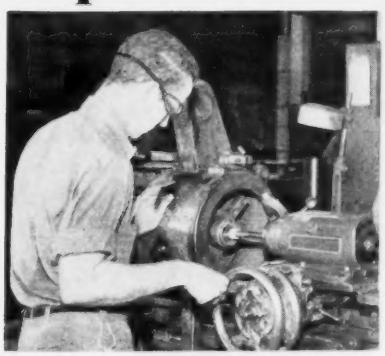
Dow Corning CORPORATION
MIDLAND, MICHIGAN

ATLANTA BOSTON CHICAGO CLEVELAND DALLAS DETROIT LOS ANGELES NEW YORK WASHINGTON, D. C.

Circle 597 on Page 51

Circle 598 on Page 51→

Take a Closer Look at PENINSULAR'S Superior Grinding Wheel Economies



Definite savings stand out clearly when you use Peninsular Grinding Wheels. It's the natural result of our abrasive engineers' magnifying the so-called "little things" and providing you a specification that adds up to definite savings and more production—all at no increase in wheel cost!

Asking for the services of a Peninsular abrasive engineer results in savings comparable to that produced by the typical internal grinding operation shown to the left. Here, the Peninsular specification bettered prior standards by 12.8%, based upon number of parts produced. The wheel corner was rigid and lasting and much less dressing was needed.

Write your nearby Peninsular distributor or us for a study of the extra economies possible when these individually engineered wheels are on the job—*any* job!

Resinoid and Vitrified Grinding Wheels

PENINSULAR

GRINDING PENINSULAR WHEELS

District Representatives and Distributors in All Principal Cities

PENINSULAR GRINDING WHEEL DIVISION—ABRASIVE AND METAL PRODUCTS CO.—DETROIT, MICH.

YOU'LL DO A BETTER JOB

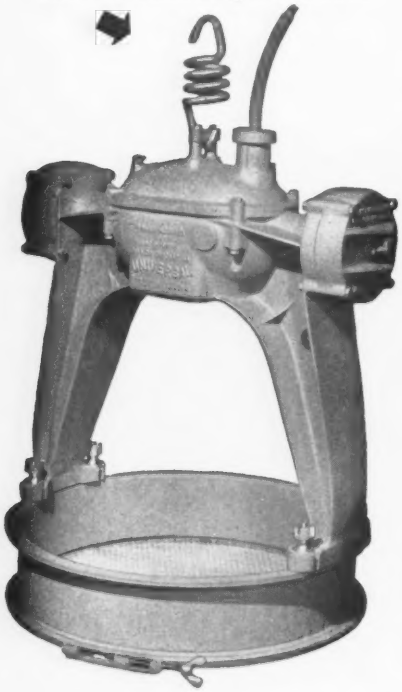
with **H. V. ADAMS DESIGNED**

HIGH EFFICIENCY FOUNDRY TOOLS

"UNIVERSAL FREE WHEELING"

FOUNDRY SAND RIDDLE

with the Double Eight Vibration

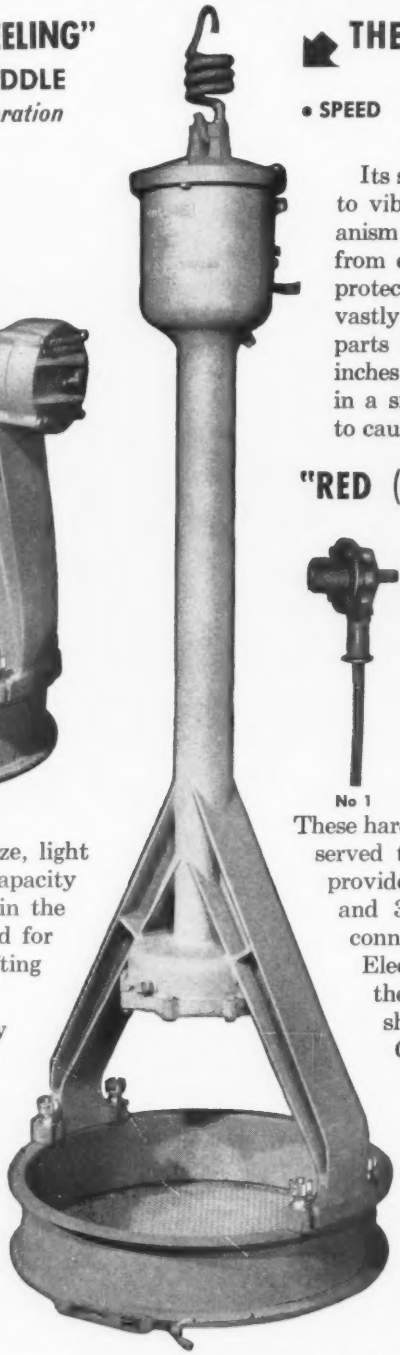


Because of its convenient size, light weight and good riddling capacity it long has been a favorite in the foundry. It also can be used for mixing core sand or for sifting sand directly into molds.

The mechanism is entirely enclosed protecting it from harmful dust and grit.

The main frame is cast in very strong tough aluminum.

It uses quick change ferruled sieves with 20 in. diameter sifting area. There are no loose wires to harm hands.



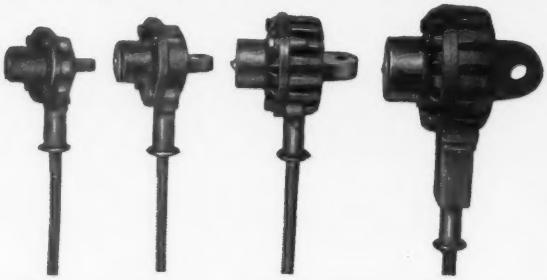
THE "ROTOPLANE" SPEED SIFTER

WILL GIVE YOU

- **SPEED**
- **ECONOMY**
- **SAFETY**
- **LONGER LIFE**
- **GREATER SIFTING CAPACITY**

Its sturdy one-piece frame and long shaft add to vibration effectiveness. The sealed-in mechanism assures protection of motor and bearings from exposure to dust and grit. This sealed in protection and "Rotoplane's" free-rotary action vastly increase bearing life. No exposed moving parts endanger the operator. Sieves have 20 inches diameter clear sifting area—are mounted in a smooth steel ferrule with no jagged edges to cause dangerous cuts and scratches.

"RED (Devil) ELECTRIC" VIBRATORS



No 1 No. 2 No. 5 No. 9

These hard hitting Adams designed Vibrators have served the foundries for over 30 years. They are provided with a 6 foot 3 wire authorized cable and 3 wire grounded connector which, when connected with our 3 wire grounded Red Electric Knee Switch, automatically grounds the vibrator protecting the worker from shock. The vibrators have passed the U. S. Government code inspection.

Other Foundry Products:

- **No. 11 NOISELESS TYPE VIBRATOR**
- **A-20 ELECTRIC VIBRATOR**
- **RED ELECTRIC KNEE SWITCHES**
- **"ROTO" ADJUSTABLE BIN VIBRATOR**
- **2 MIN. UNIVERSAL FINENESS TEST SIFTER.**
- **UNIVERSAL TRIPOD CARRIER**

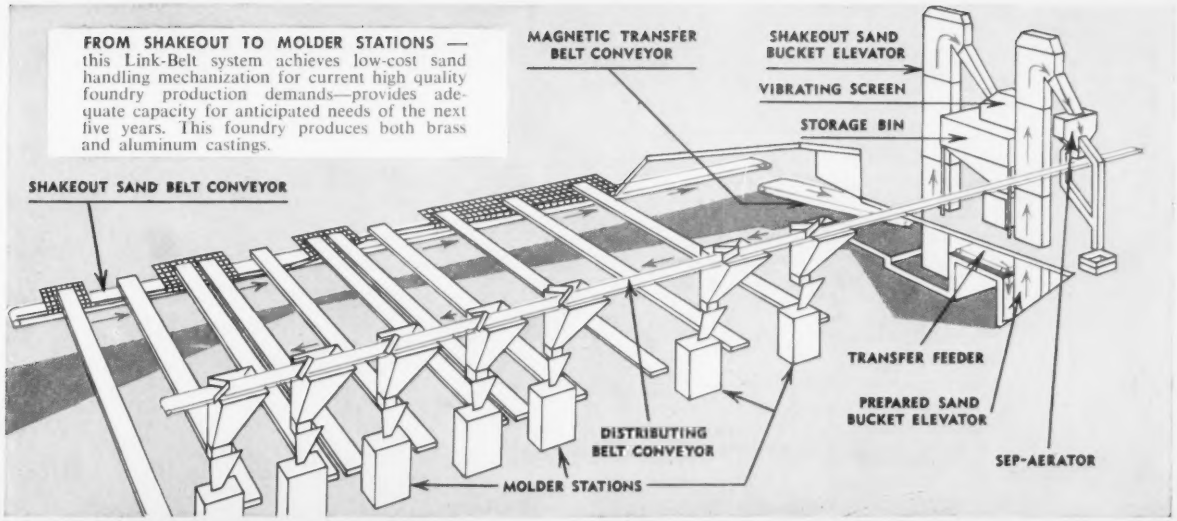
ORDER ALL SIFTERS AND VIBRATORS WITH GROUND WIRE!!

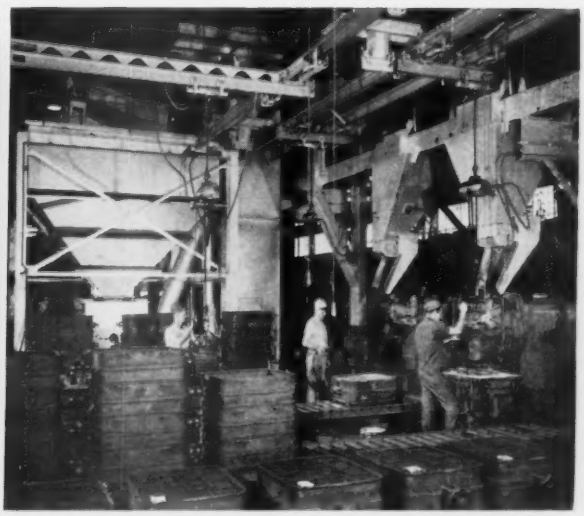
FOUNDRY SUPPLIES MANUFACTURING CO., NOT INC.

2221 Orchard Street - Chicago 14, Illinois

Established 1918 **Cable Address: "Rotoplane Chicago"** **H. V. ADAMS, Mgr.**

FROM SHAKEOUT TO MOLDER STATIONS — this Link-Belt system achieves low-cost sand handling mechanization for current high quality foundry production demands—provides adequate capacity for anticipated needs of the next five years. This foundry produces both brass and aluminum castings.





DISTRIBUTING BELT CONVEYOR for prepared sand runs directly above individual molding stations. Conveyor is equipped with air-actuated duplex plows which deliver sand to series of molders' hoppers. Finger tip selection assures availability of sand where required and in quantity desired.

BRASS FOUNDRY achieves smooth coordination of sand handling and molding operations in compact area. Link-Belt equipment includes vibrating screen, storage bin, prepared sand bucket elevator, Sep-Aerator, overhead belt conveyor and molding stations.

In 1946...in 1956—Link-Belt helps Gardner-Denver Company

mechanize for greater profit

HAVING experienced many years of dependable, low cost handling of sand, molds and castings with Link-Belt equipment at their La Grange, Missouri foundry, Gardner-Denver Company again had Link-Belt mechanize their new Quincy, Illinois foundry.

Results — a clean, orderly foundry, maximum capacity, better working conditions, uniformly prepared sand, fewer rejects—all of which make for better castings at a lower unit cost. Yes, you get these and many more benefits when you mechanize with Link-Belt sand handling equipment. Call your nearby Link-Belt representative for consultation on your sand, mold and castings handling problems. Or write for Book 2423.

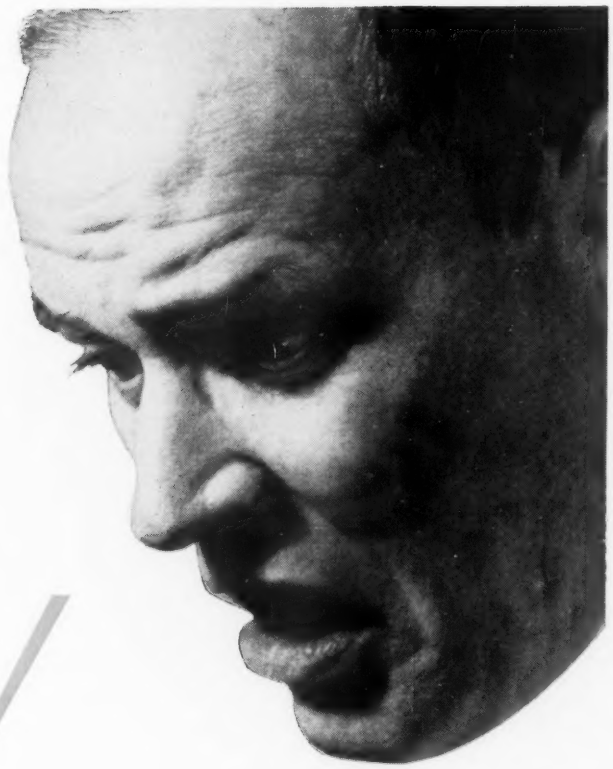
LINK-BELT

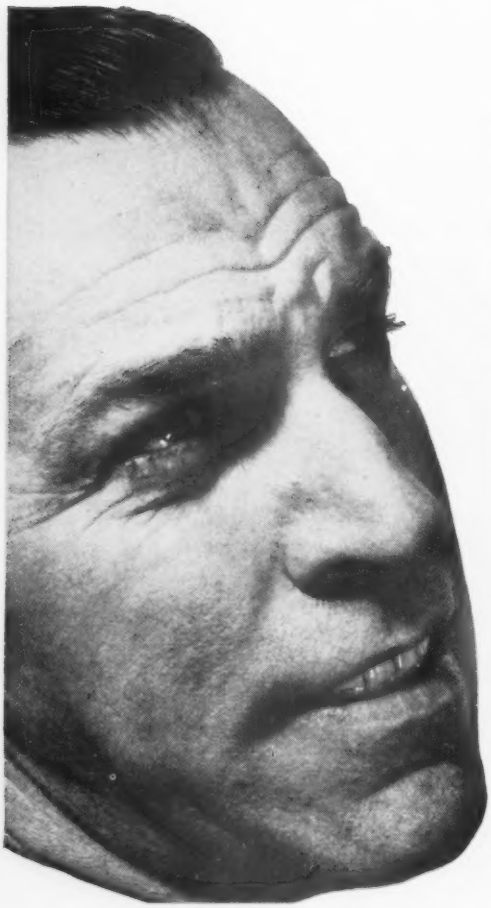
CONVEYORS AND PREPARATION MACHINERY

LINK-BELT COMPANY: Executive Offices, Prudential Plaza, Chicago 1. To Serve Industry There Are Link-Belt Plants and Sales Offices in All Principal Cities. Export Office, New York 7; Canada, Scarboro (Toronto 13); Australia, Marrickville (Sydney), N.S.W.; South Africa, Springs. Representatives Throughout the World. 14.823

Circle 600 on Page 51

They're both right!





Man on the left claims that Tru-Steel does the best cleaning job at lowest cost. Fellow on the right swears by Malleabrasive. But they're *both* right! Tru-Steel is best on some jobs... Malleabrasive is best on others. Different jobs may call for different abrasives but the result should always be the same—the best job at lowest cost per ton of castings cleaned. Whichever you need, Pangborn has the right abrasive for your job. Our sales engineers are experts on abrasives. Ask the one in your area for his advice or write PANGBORN CORPORATION, 1400 Pangborn Blvd., Hagerstown, Maryland.

Manufacturers of Blast Cleaning and Dust Control Equipment

Pangborn FOR

MALLEABRASIVE®

AND **TRU-STEEL SHOT**

No other single machine performs such a variety of operations in one set-up

It takes several machines to do all that's now possible with just one BOKOE No. 3 Universal Milling and Boring Machine. Because no other machine combines all these versatile features—for non-ferrous, cast iron and alloy steel tooling, patterns and production to close tolerances:

Large work table and deep throat handles many jobs in one set-up. Easily accessible for bulky parts up to 8′ 2″ dia.; distance between column slide and spindle center 37½″. Automatic controls on work table provide 28″ traverse and 55″ longitudinal movement; table feeds infinitely variable from 4″ to 39″ per min.

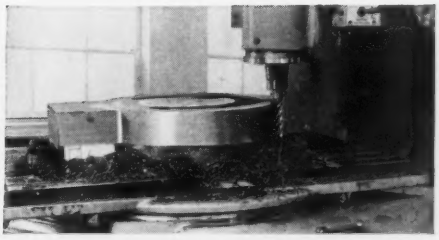
Circular milling with automatic power feed for circular movement of work table infinitely variable from 7″ to 70″ per min. (at a diameter of 40″), for continuous rotary milling as well as for radius milling.

Variable speed changer with spindle speeds from 36-1800 rpm can be operated without stopping machine.

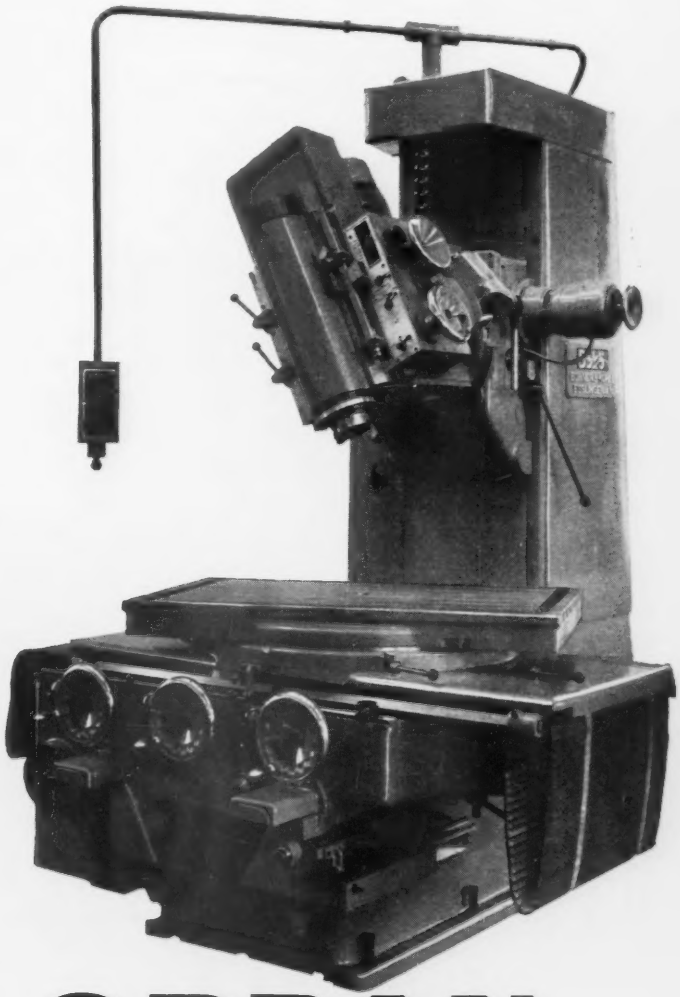
Swiveling column turns 180° horizontally in either direction . . . permits radial drilling in addition to vertical milling, universal milling and boring up to 11⅞″ with large milling slide; six mechanical feeds and rapid travel. Milling head on column swivels vertically 90° in either direction.

Get to know the big BOKOE No. 3 — how it is doing the work of several machines . . . more economically . . . for such companies as Convair (4); Ford (3); Motor Pattern (7); General Electric, Lockheed, General Motors and hosts of others. **Write for complete details.**

you'd need several machines to do all the different jobs you can produce on one BOKOE universal miller



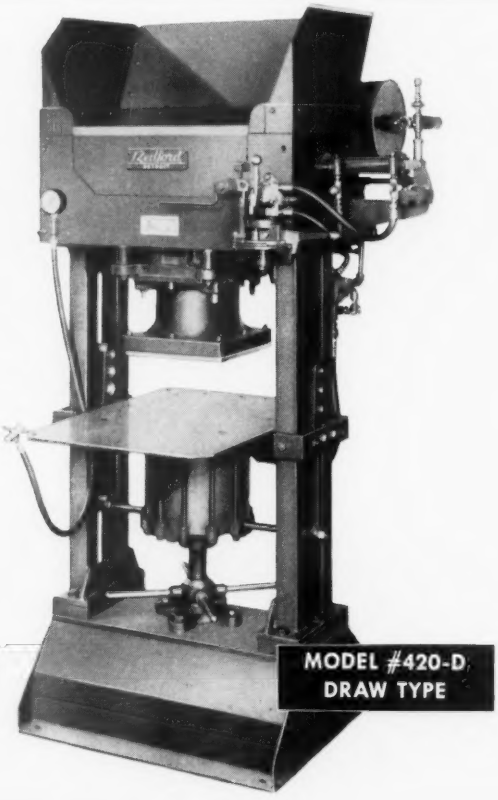
Built-in circular table with power feed and tilting milling head is ideal for bulky work pieces. Also in smaller Model No. 2.



KURT ORBAN COMPANY, INC.

38 Exchange Place, Jersey City 2, N. J. • In Canada: 2490 Eglinton Ave. W, Toronto

Circle 602 on Page 51



Redford CORE BLOWER AND CORE SHOOTER

Here is a core making machine that is setting new standards in versatility and performance. The #420 Redford is equipped *to make cores up to 20 lbs. using any type binder.* Proven core blowing practices may be continued to do the most intricate work and to assure maximum production. Tough sand mixes which do not readily lend themselves to blowing can be used in ramming or shooting cores.

Core shooting requires a fast acting machine having sufficient capacity to propel sand at high velocity through a large shoot head opening. The large shoot head opening offers little resistance to the flow of sand and allows any sand to be rammed into suitable open cavity core boxes ahead of the propelling air.

With the #420 Redford we offer a tool that allows you the widest choice of application. It is a properly balanced combination of standard Redford practices that makes possible a low cost machine of greater usefulness and versatility to meet today's core room requirements.

Redford IRON & EQUIPMENT CO.
20733 Glendale • Detroit 23, Michigan
Phone: KEnwood 1-8611

For Complete Information write for
BULLETIN #42

Circle 603 on Page 51
Circle 604 on Page 51→

FLUOR PRODUCTS COMPANY
A DIVISION OF THE FLUOR CORPORATION, LTD.

by agreement with

MASCHINENFABRIK HARTMANN A. G.
OFFENBACH/ MAIN, GERMANY

is pleased to announce that it now has the exclusive license in the United States, Canada and Mexico for the design, fabrication and sale of

Hartmann Pneumatic and Mechanical Conveying Systems, Ash Handling Systems, Dust Removal and Classifying Systems

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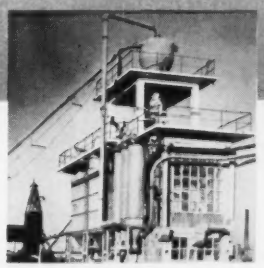
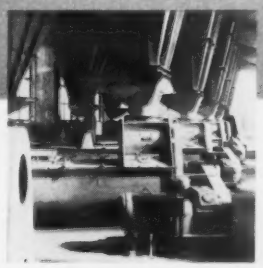
Over 50 Years' Design Experience in a Wide Variety of Industrial Applications . . .



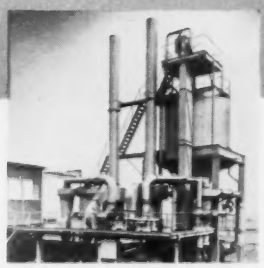
PNEUMATIC CONVEYING

Hartmann has designed, fabricated and installed over 1000 systems for more than 200 different industrial applications. The first, in 1903.



MECHANICAL CONVEYING

In belt, screw, chain, plate and bucket types — experienced in standard and special applications and in combination with pneumatic systems.



DUST REMOVAL SYSTEMS

Fluor-Hartmann designs wet or dry types or combinations of both for critical industrial applications ranging from de-dusting to air sifting.

Sales Offices in:

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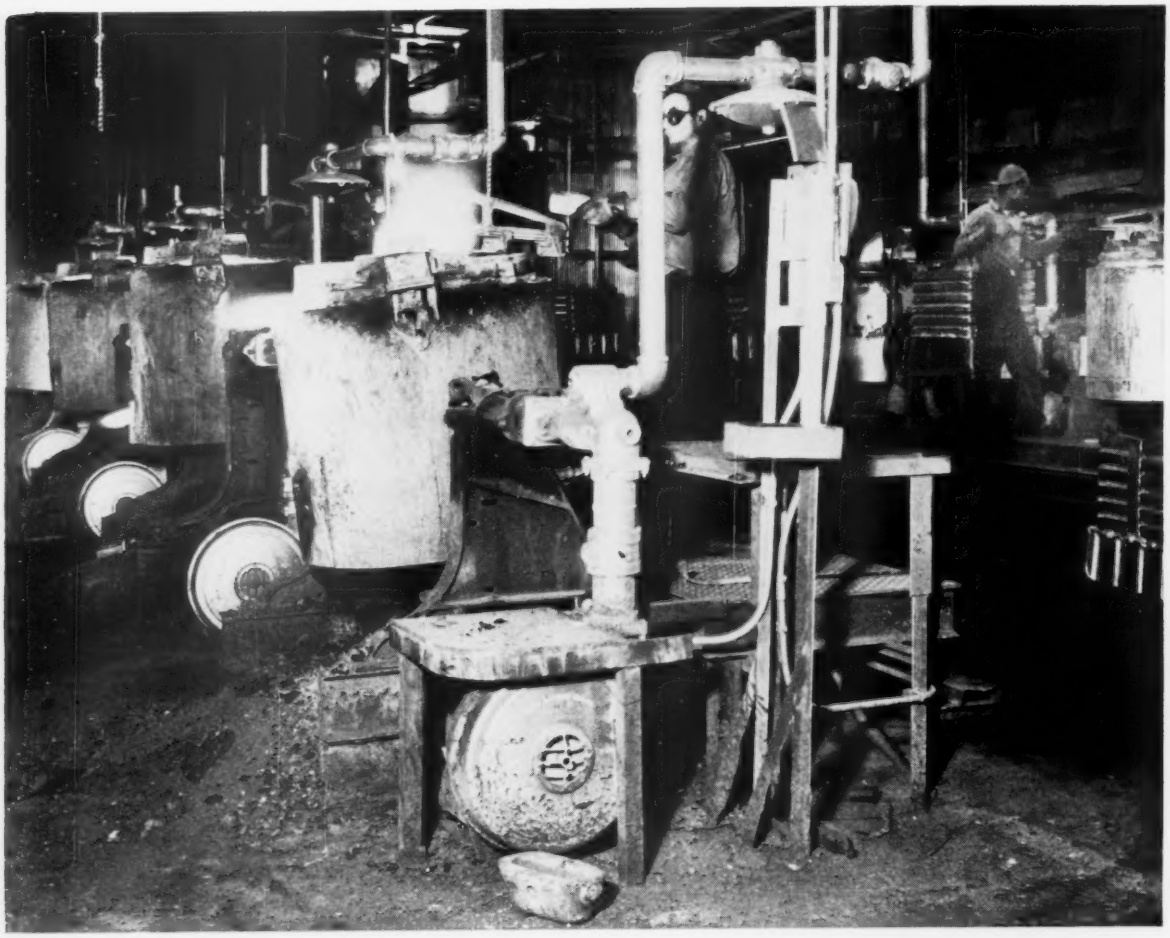

Schaible Company finds Blowers that can take it

The air in this typical production foundry is full of sand and dirt—but North American blowers, designed for heavy duty, give constant pressure year-in and year-out, even on these really tough jobs. Foundry success depends on steady operation—steady blower operation.

All 18 Campbell-Hausfeld tilting crucible furnaces in this brass foundry use:
North American No. 300 Turbo Blowers
North American No. 65 Aspirator Mixers
North American
No. 18 Atmospheric Regulators
North American No. 25 Butterfly Air Valves

For Better Blowers – Buy North American

NORTH AMERICAN COMBUSTION since 1917

the NORTH AMERICAN mfg co
Combustion Engineers
4455 East 71st St. • Cleveland 5, Ohio

CEDAR HEIGHTS
AIRFLOATED CLAY

is actually refined to 200 mesh.
It is something new in the industry . . . a superior bonding clay with a vast range of applications. Lab control assures consistent quality. We also produce quality Fire Clay and Bonding Clay.

Note: Cedar Heights Airfloated Clay is available to foundrymen everywhere every day of the year

MINERS
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SHIPPERS

CEDAR HEIGHTS CLAY COMPANY

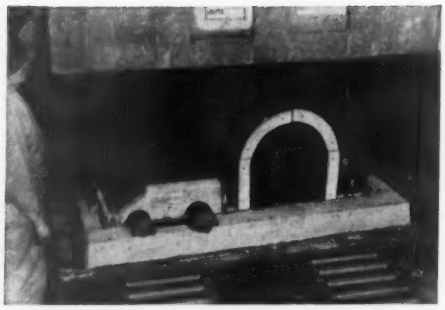
50 PORTSMOUTH ROAD
OAK HILL, OHIO

Let us send you the name of your nearest distributor. You'll be glad you inquired.

P.S. Let us furnish a free sample for your examination

Circle 606 on Page 51

After only 90 seconds of vibrating, 2500 pounds of core "come clean".



CP Core Box Vibrator frees 3000 pound cores in 90 seconds!

In just a minute-and-a-half this Core Box Vibrator frees cores weighing up to a ton-and-a-half! Core output is greatly increased and you get a perfect draw every time. Cores come out with no flaws, damaged edges, distorted sections or dimensional variations . . . there's no time wasted troweling. Needs no special adaptors . . . the built-in air clamp holds the vibrator securely to any core box cleat up to 6¼" wide. Its 9000 orbital vibrations per minute eliminate sledging . . . reduce core box maintenance to a minimum. In spite of the core size, the CP vibrator is positioned only once. Write for free demonstration on your work.

Chicago Pneumatic Tool Company,
8 East 44th St., New York 17, N. Y.

Chicago Pneumatic

PNEUMATIC TOOLS • AIR COMPRESSORS • ELECTRIC TOOLS • DIESEL ENGINES • ROCK DRILLS • HYDRAULIC TOOLS • VACUUM PUMPS • AVIATION ACCESSORIES

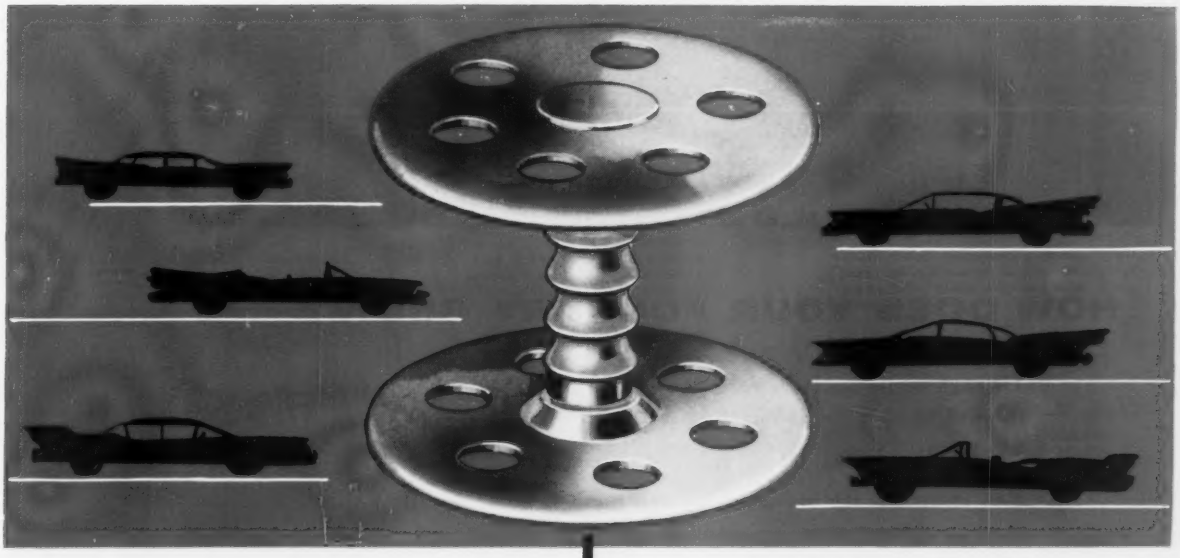
automobile styles may change...

but motor car manufacturers unanimously choose

fine FANNER

DOUBLE HEAD MOTOR CHAPLETS

for producing sound, uniform castings



The tremendous flow of uniform, sound castings necessary to the automotive industry must be maintained with no sacrifice in quality. That's why more Fine FANNER motor chaplets have been used by more producers of automotive castings than all other types combined.

Fine FANNER motor chaplets with their exclusive designs, their positive core support, accuracy of production and their complete fusion help produce better, sounder castings at lower cost.

Prevent costly product failures due to unsound castings by using fine FANNER motor chaplets for all your requirements.

Only a few of the wide range of motor chaplets made by FANNER are shown here — get acquainted with the complete line by writing today for your free copy of the FANNER Chaplet Catalog.

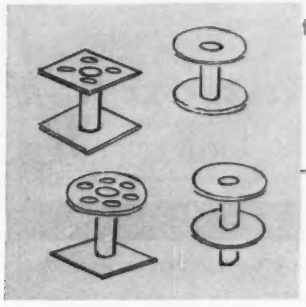
ENGINEERING SERVICE

Qualified and specialized engineers in Fanner's Technical Service Division are available for consultation, without obligation, on problems of producing more intricate castings; developing increased strength, closer tolerances, and better quality; reducing machining and improving finish — both in ferrous and non-ferrous castings. Take advantage of the research and development work that Fanner has invested in this field to improve your profit picture! Simply direct your request to the address shown below.

THE FANNER MANUFACTURING COMPANY

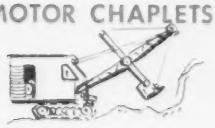
designers and manufacturers of fine FANNER CHAPLETS AND CHILLS

BROOKSIDE PARK CLEVELAND 9, OHIO

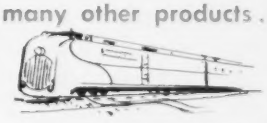


there are *fine* FANNER MOTOR CHAPLETS for many other products . .

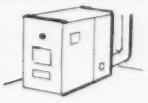
pumps



road machinery



locomotives



furnaces

stoves

farm machinery

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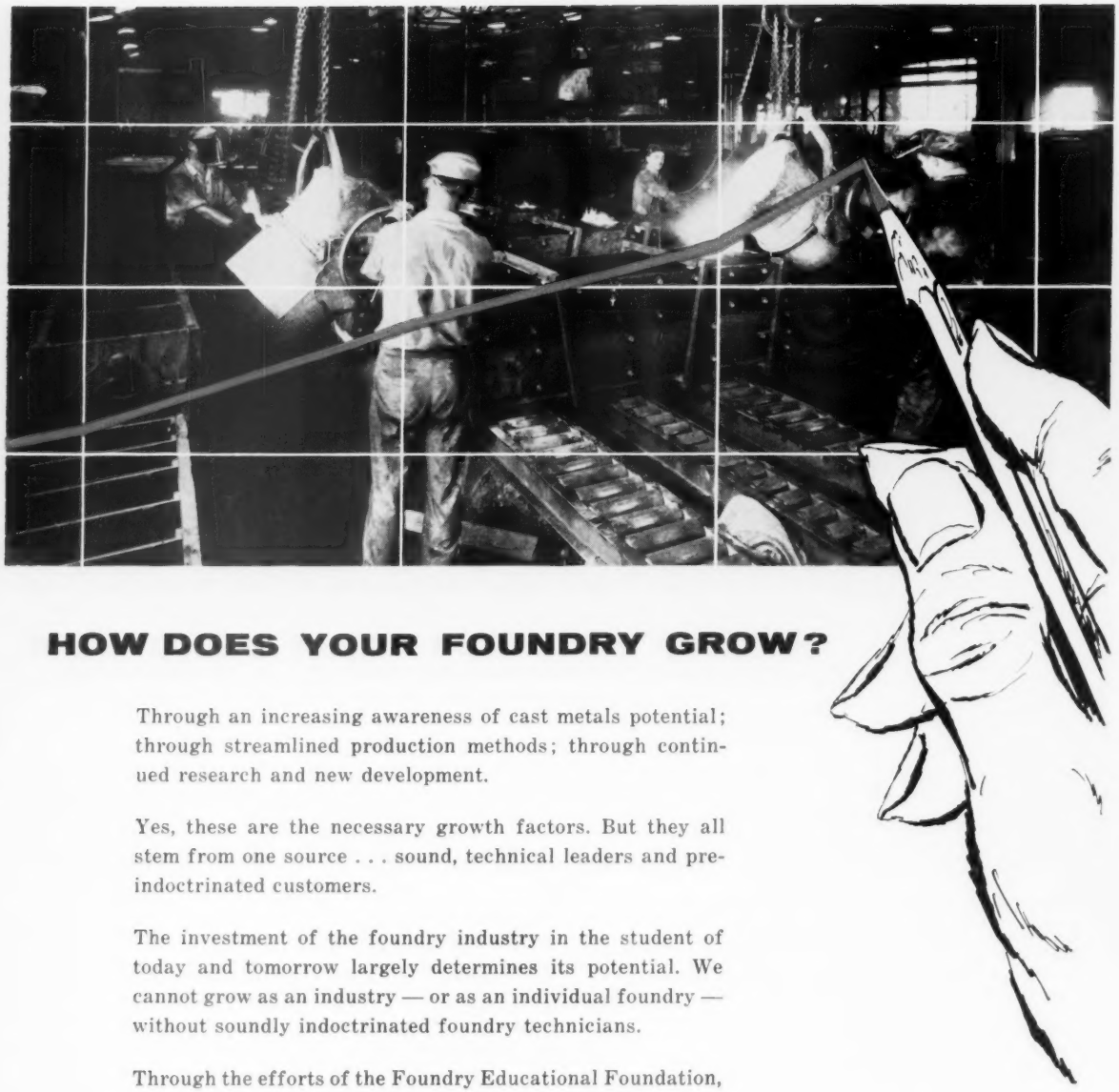

HOW DOES YOUR FOUNDRY GROW?

Through an increasing awareness of cast metals potential; through streamlined production methods; through continued research and new development.

Yes, these are the necessary growth factors. But they all stem from one source . . . sound, technical leaders and pre-indoctrinated customers.

The investment of the foundry industry in the student of today and tomorrow largely determines its potential. We cannot grow as an industry — or as an individual foundry — without soundly indoctrinated foundry technicians.

Through the efforts of the Foundry Educational Foundation, 31% of all engineering students at F.E.F. affiliated universities now participate in cast metals study. This means a large annual pool of capable producers for the foundry industry.

What are you contributing to that pool today, for your greater benefit tomorrow?

Write today for our detailed booklet, "Let's Look Ahead".

Foundry Educational Foundation

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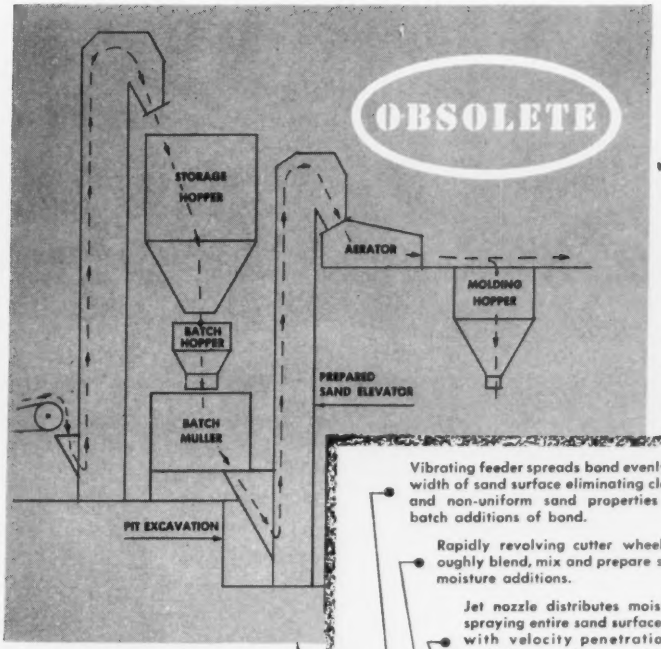
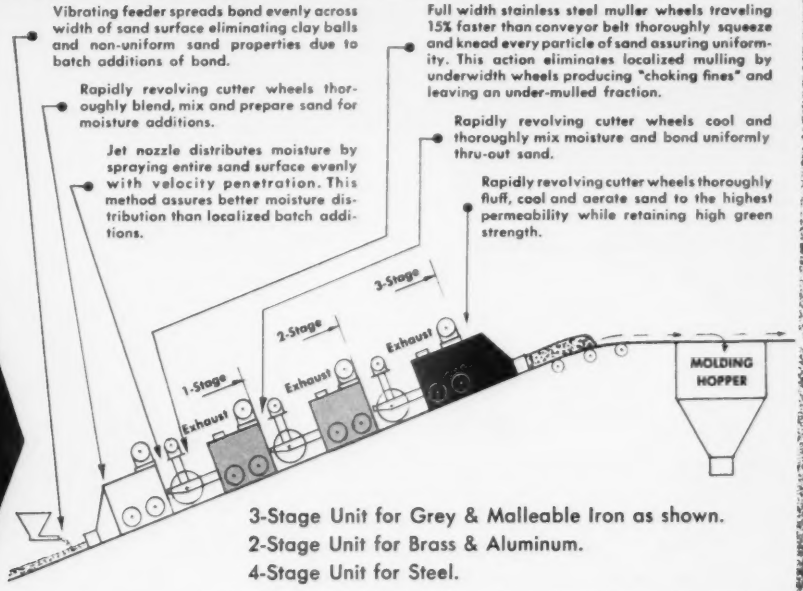


"WHY BUY OR USE AN OBSOLETE MULLER"

. . . that requires this unnecessary and costly equipment

WHEN FOR **1/3** the **PRICE**

You can get **3 TIMES THE CAPACITY** with the simple and efficient Pekay Mixer Muller


Vibrating feeder spreads bond evenly across width of sand surface eliminating clay balls and non-uniform sand properties due to batch additions of bond.
Rapidly revolving cutter wheels thoroughly blend, mix and prepare sand for moisture additions.
Jet nozzle distributes moisture by spraying entire sand surface evenly with velocity penetration. This method assures better moisture distribution than localized batch additions.
Full width stainless steel muller wheels traveling 15% faster than conveyor belt thoroughly squeeze and knead every particle of sand assuring uniformity. This action eliminates localized mulling by underwidth wheels producing "choking fines" and leaving an under-mulled fraction.
Rapidly revolving cutter wheels cool and thoroughly mix moisture and bond uniformly thru-out sand.
Rapidly revolving cutter wheels thoroughly fluff, cool and aerate sand to the highest permeability while retaining high green strength.
3-Stage
2-Stage
1-Stage
Exhaust
Exhaust
Exhaust
MOLDING HOPPER

3-Stage Unit for Grey & Malleable Iron as shown.
2-Stage Unit for Brass & Aluminum.
4-Stage Unit for Steel.

Every unit guaranteed to meet customer requirements.

THE ADVANCE PEKAY MIXER MULLER FEATURES:

- 3 to 300 T.P.H. of superior quality molding sand. Only one (1) Pekay Muller required for this capacity.
- Separate mixing, mulling and aerating phases, a Pekay exclusive. Each phase is designed and engineered to properly perform its individual function.
- Lower inertia rotating parts that reduce horse power to less than ½ required by batch mixing.
- Accessible, wear-resistant parts reducing maintenance to absolute minimum.
- Continuous mixing and mulling while conveying with no discharge time required and no costly elevator problems.
- No lost production due to mechanical breakdown another Pekay exclusive. Individual sectional drives overcome complete unit stoppage. Should breakdown occur in any part of machine, remaining sections continue to properly condition sand.
- Progressive cooling due to removal of heat by the Pekay exclusive "air-thru-sand-shower" process.
- Lower height requirements eliminating costly high buildings, unnecessary pit excavations and building alterations.

PEKAY MACHINE & ENGINEERING CO. INC.

870 N. SANGAMON STREET — CHICAGO 22, ILLINOIS

Specialists in foundry sand conditioning and handling, slurry systems, engineering and equipment

NAME_____ TITLE_____

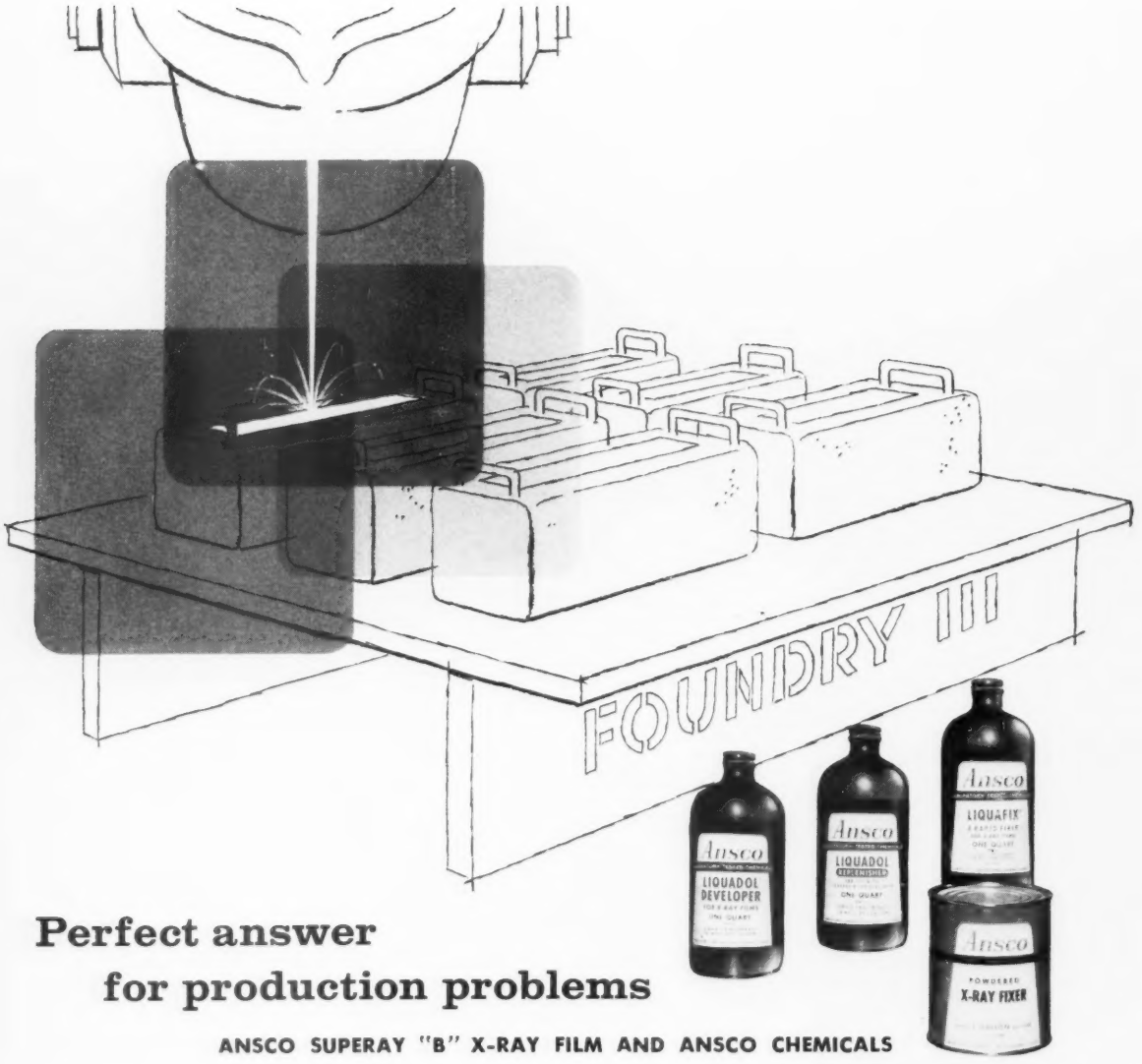
COMPANY_____

ADDRESS_____ CITY AND STATE_____

I would like information on:

☐ Pekay Mixer Mullers ☐ Pekay Coolerator
☐ Pekay Sand Systems ☐ Pekay Airators
☐ Pekay M-T-Matic Buckets

Circle 610 on Page 51



Perfect answer for production problems

ANSCO SUPERAY "B" X-RAY FILM AND ANSCO CHEMICALS

More and more, when foundries want a film for radiographic aid in developing a pouring practice, they choose Ansco Superay "B"—*for good reasons!*

Superay "B" provides characteristics especially useful to the foundry industry. Exceptionally high contrast combined with extremely fine grain enhances visibility by bringing out minute discontinuities. A natural brilliance and a blue tint which subdues glaring highlights also contributes to easy readability. Use Ansco Superay "B" in your shop, *see the difference.*

For best processing results, use dependable Ansco chemicals:

Liquadol X-ray Film Developer: Fast working solution brings out maximum definition, contrast and density in all radiographs.

Liquadol Replenisher: Insures uniform developing results without increase in normal development time.

Liquafix Fixing Solution: Fast-clearing, fast-fixing, liquid formula.

Powdered X-ray Fixer: Fast-fixing, high capacity preparation with low-stain potential.

Ansco

America's Oldest Maker of Photographic Materials

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A Division of General Aniline & Film Corp.

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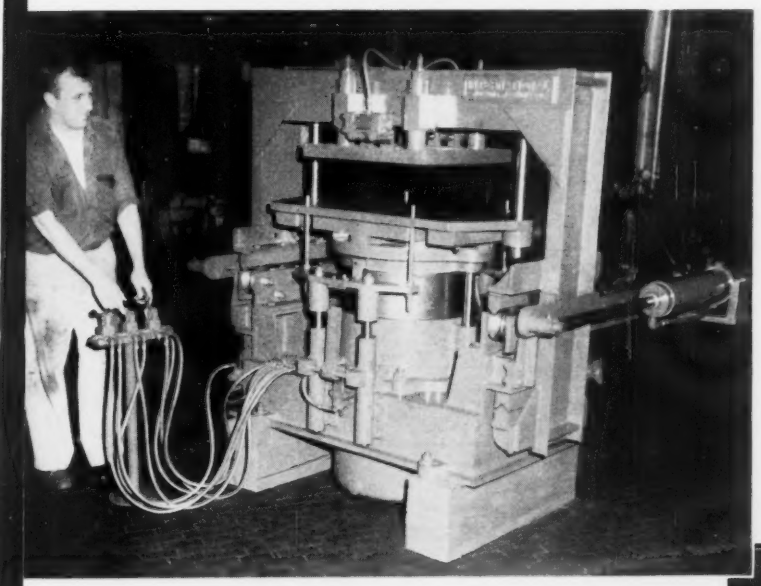
SK20

Jolt-Squeeze-Drop Strip or Pin Push Up *or* Drop Strip Roll On - Roll Off



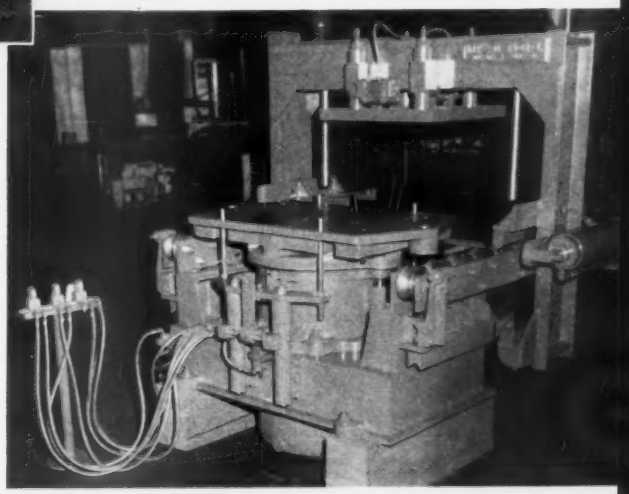
Here is a new machine, designed for larger requirements, incorporating sound engineering features, that can be made with

any size jolt
any size squeeze
any size draw
for any size job.

The SK20 illustrated has 20″ squeeze cylinders, an 8″ jolt cylinder, and is designed as a multiple molding machine—with a 4″ draw. Picture shows hand control valves. It can also be furnished with partial or completely automatic control cycle.

Operational Features of the SK20

- ★ Head moves out – away from table of machine for easy loading of sand and flask.
- ★ Head moves in – Large V guides insure proper alignment of head over table for accurate and square, uniform squeeze – and true draw.
- ★ Two large cylinders control the movement of the head with oversized deceleration valves for cushioning.
- ★ Can be loaded from front – side – or rear.



The INTERNATIONAL LINE is designed by experienced foundry engineers who have a practical working knowledge of the problems of the industry.

Write, telling us your particular needs.

We will forward complete information and suggestions.

by INTERNATIONAL

MOLDING MACHINE COMPANY

LAGRANGE PARK, ILLINOIS

CALIFORNIA FOUNDRY reports

DAVENPORT HANSBERG *Shooter.* 500%

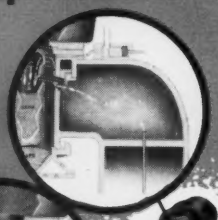
increased core production over former method

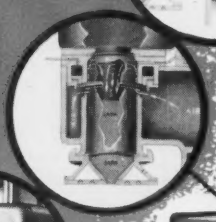
Quality and uniformity showed great improvement.

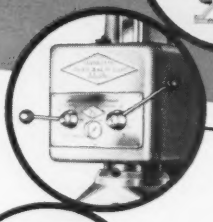
MANIFOLD CORE
No vent or blow holes used in the body of this core, which is impossible in core blowing.

1 AIR STORED DIRECTLY BEHIND SAND
No diaphragm valve or pipes to choke shoot effect. Therefore unparalleled ramming effect with least possible air consumption.

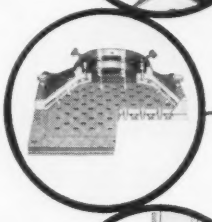
2 LARGEST POSSIBLE ANNULAR RING-VALVE
(U. S. Patent) permits full air pressure to explode upon sand in shortest possible time (shoot effect). Air does not get time to go through sand as in blowers, but stays behind sand, therefore no sandblasting.



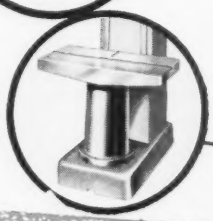




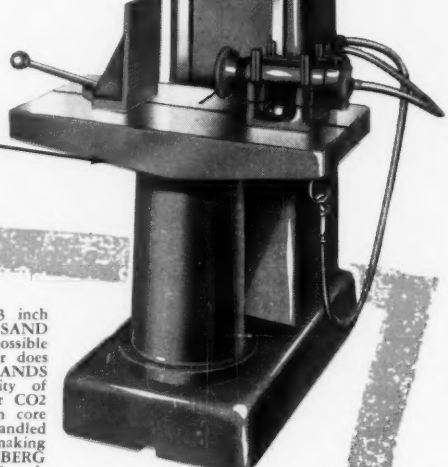
3 ONLY TWO CONTROL LEVERS. Left handle for hydraulic adjustment of table height (also hydraulic draw of core box). Right handle, semi-automatic for horizontal and vertical clamping and shooting. (Push button cycle timing is also available.)



4 SHOOTER HEADS are quick interchangeable with 3 types available — UNIVERSAL HEAD, STANDARD HEAD or SPECIAL HEAD — Built to meet special core specification.



5 RAPID CHANGE OF CORE BOXES. Adjustable table height hydraulically operated, telescoping cylinders, hydraulic AND air operated with 12 inch hydraulic and 7 inch air draw.



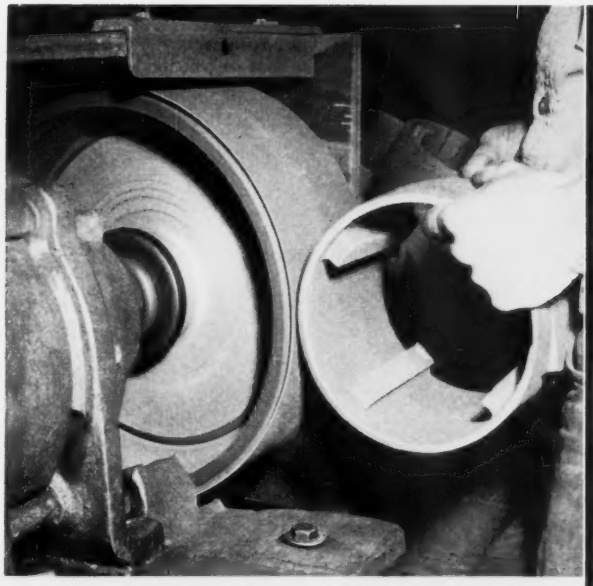
ADDITIONAL FEATURES

AIR CONNECTION requires only 1 inch pipe line as compared to 2½-3 inch diameter pipe lines for same size blower — Low air consumption. STOPS SAND BLASTING of core boxes — longer life of equipment. Wooden boxes possible without special attachments. VENTING is simplified since the propelling air does not mix with the sand and only atmospheric air is removed from core box. SANDS WITH EXCEPTIONAL GREEN STRENGTH can be used with majority of core boxes. High green strength sands, oil sands, molding sands, sands for CO_2 PROCESS, shell molding resin sands, resin cereal core sands, pelleted pitch core sands etc., — which are either difficult or impossible to BLOW, can be handled by "SHOOTING". "SHOOTING" is the ADVANCED METHOD of making foundry CORES more uniform, in less time, at a lower cost. HANSBERG "SHOOTERS" is a patented method of shooting cores and at the International Foundry Exhibition held in Germany this "Core Shooter" was the outstanding machine displayed — (over 4,000 are in operation).

FIVE SIZES — "DAVENPORT SHOOTERS"
built in 5 sizes, capacities 4 - 17 - 42 - 88 - 250 pounds.

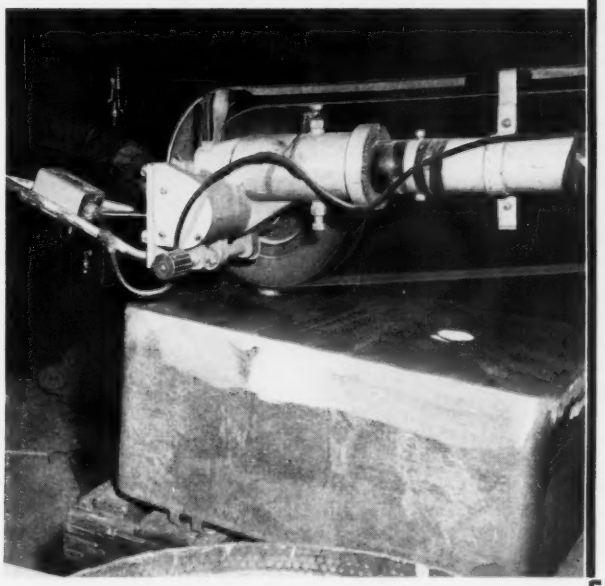
The term "Shooter" is a registered trademark of Davenport Machine and Foundry Company.

DAVENPORT MACHINE AND *Foundry Company*
Davenport, Iowa, U.S.A.



California foundry uses a 3M Coated Abrasive belt to remove parting lines on steel electric motor frames. Belts replaced hard wheels, provide a vastly superior finish.

Connecticut foundry finds 3M Coated Abrasive discs ideal for removing flash from cast aluminum potato peelers. Disc gives an excellent finish—blends area *fast*.



Eastern non-ferrous foundry uses 3M Coated Abrasive belts to cut rises from aluminum traffic signal control boxes. Belts helped increase production 50% over the old method.

Cut foundry costs . . . boost production with 3M Coated Abrasives

Here's the *modern* method for putting a quality finish on your castings. 3M Coated Abrasives—belts or discs—are engineered to give you better, faster finishing at lower unit costs. Regardless of your method of casting—sand, shell, die or CO_2—these modern grinding and finishing tools will do an outstanding job for you, help you increase production, cut costs.

Find out how 3M Coated Abrasives can go to work in *your* foundry. Call your 3M Representative *today* or send coupon below.

Send today for FREE Booklets

Minnesota Mining and Manufacturing Co.
Dept. CN-117, St. Paul 6, Minn.

- ☐ Send me free booklet: "The 3M Method of Belt Grinding and Finishing"
- ☐ Send me free booklet: "Grinding and Finishing Nonferrous Metals with 3M Abrasives"
- ☐ Please have a 3M Representative call

Name_____ Title_____

Company_____

Address_____

City_____ Zone_____ State_____

3M ABRASIVES

Made in U.S.A. by MINNESOTA MINING AND MFG. CO. General Offices: St. Paul 6, Minn. In Canada: P.O. Box 757, London, Ontario. Export Sales Office: 99 Park Ave., N.Y. City.

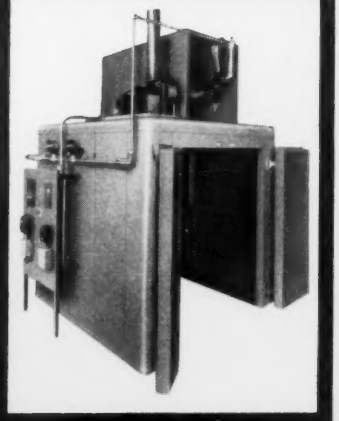
Circle 614 on Page 51

Foundry Products and Production Rates Dictate Oven Requirements

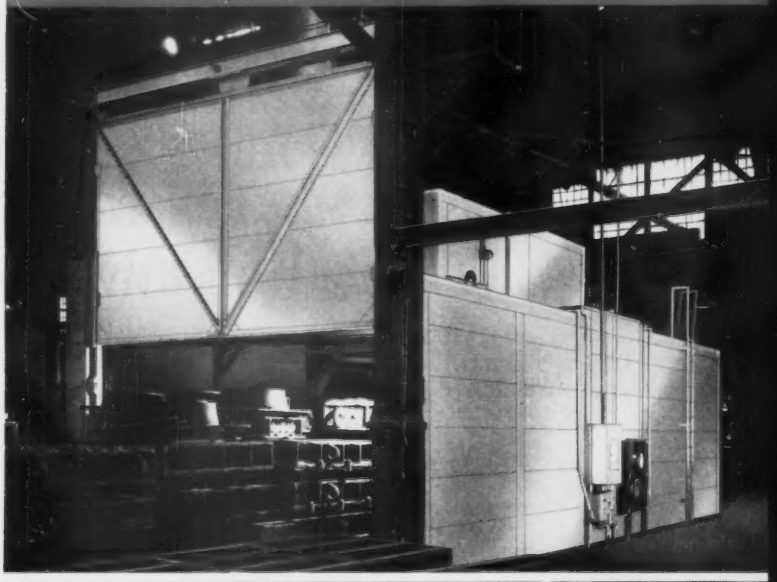
LANLY can meet any and all of yours

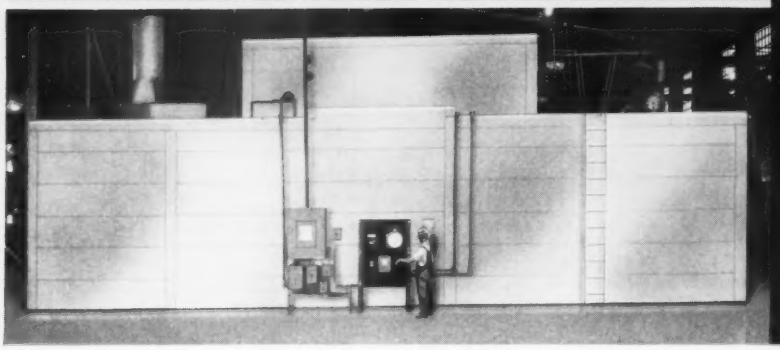
- from Small RACK TYPE OVENS

generally used when the baking of smaller cores is required in the production operation of your foundry.



-to Gigantic CAR TYPE OVENS





when the drying of large molds and cores for bigger castings is required.

This huge installation in the foundry of a large supplier of railroad products efficiently and economically carries its share of the load in the production of better castings.

Consult LANLY for a proposal on foundry ovens before you buy. A check of your present equipment may disclose a fuel eater, a core spoiler or a heat loser amongst them.

WRITE FOR THE LATEST CATALOG AND FACTS ON ANY INSTALLATION

THE Lanly CO.
FOUNDRY OVENS
780 Prospect Ave. • Cleveland, Ohio

To replace muscle with machinery on a moderate budget,
Michigan Model 12B Tractor Shovel

Boosts Foundry Production 16%

for Wisconsin Foundry & Machine Company, Madison, Wisconsin

This thriving, 20-man foundry pours gray iron and semi-steel castings—averaging five tons per 9½-hour day—mainly for machine tools. But until recently all hard, heavy hauling had to be done by hand. Then company management saw a Michigan Tractor Shovel, decided to give it a try. Result? The Model 12B Michigan—working just part time—does the work of three barrowmen. The company saves $50 per day in wages, puts 30 man-hours per day into productive work. Here's how:

Removes Sand and Burnt Cores

Refuse, averaging four tons per day, used to take *eight man-hours* per day to collect, transport and load into trucks. All used sand, burnt cores, other waste can now be handled in as little as *15 minutes* by the Michigan!

Transfers New Sand in Narrow Alley

Molding sand used to be dumped outdoors, in all weather, brought into foundry by hand. Now trucks dump directly into the 16 cu ft Michigan bucket for movement to storage bins. The Model 12B transfers seven tons in only *half an hour*, despite maneuvering a narrow alley every trip!

Hauls Big Castings —Anywhere!

The Michigan Tractor Shovel picks up big castings—like 3,000-lb "skull-crackers"—and transports them 1½ blocks from foundry to yard. *One* machine and *one* operator cut time and equipment needed for this "problem job".

Hoists Heavy or Bulky Light Items

Eight workers used to manhandle 1,000-lb flasks up stairs for storage; *one man* in the Michigan now hoists them 7 feet to the second floor. Light-but-bulky wood patterns go by the bucketful from upstairs pattern shop to foundry—quickly, gently, as needed.

Odd Jobs Prove Michigan's Versatility

Foundry floor hadn't been levelled for years, the Michigan cut through the hard-packed waste to do the job in a couple of Saturday afternoons. It also has hauled plexo-brick and other supplies from trucks and nearby suppliers' warehouses —traveling at street speeds—even has transferred hard-to-handle coke from boxcars to storage bins.

See 12B In Action —In Your Own Plant

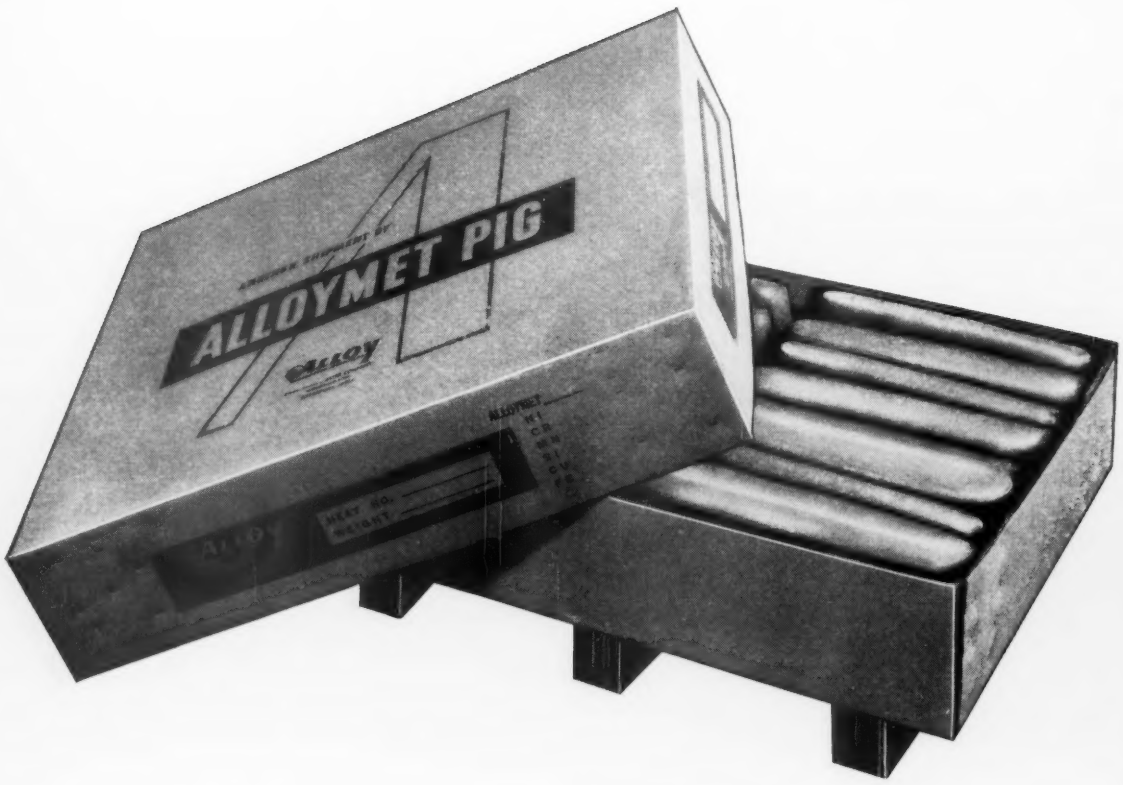
If you, too, have some material-handling jobs you're doing by hand—or some jobs you're doing with outdated loaders—a new, bigger, heavier, powershift Michigan can save you money. For proof, ask your Michigan Distributor to arrange a Model 12B demonstration right in your plant; let him help you pick the size bucket best suited to your needs: 6 to 27 cubic feet.

Michigan is a registered trade-mark of

CLARK EQUIPMENT COMPANY
Construction Machinery Division
2475 Pipestone Road
Benton Harbor 21, Michigan
In Canada: Canadian Clark, Ltd., St. Thomas, Ontario

CLARK® EQUIPMENT

Circle 616 on Page 51



no unknowns here to contaminate your alloy heats

In raw materials, this is as far as you can get from the contamination hazard present in loose or bundled nickel scrap.

It's as close as you can get to perfection . . . weight and certified analysis in plain view at all times . . . an all fiberboard palletized package ready to go into the electric furnace — without opening.

This sturdy lightweight carton not only saves on shipping costs, but reduces the chance for pilferage as well. Easily stored and handled, too — measures only 29 by 39 inches across, and 11 inches high, including the standard three-inch pallets.

If you are still using loose or bundled scrap for your alloy requirements, ask us about the advantages of using Alloymet* pig and shot of certified analysis.

*Alloymet alloys are available in a complete range of nickel chrome, nickel iron and nickel copper analyses.

ALLOY METAL PRODUCTS, Inc.
PHONE 6-2561 • TELETYPE DV 588
(FORMERLY A DIVISION OF **ALTER COMPANY**)
ROCKINGHAM ROAD
DAVENPORT, IOWA

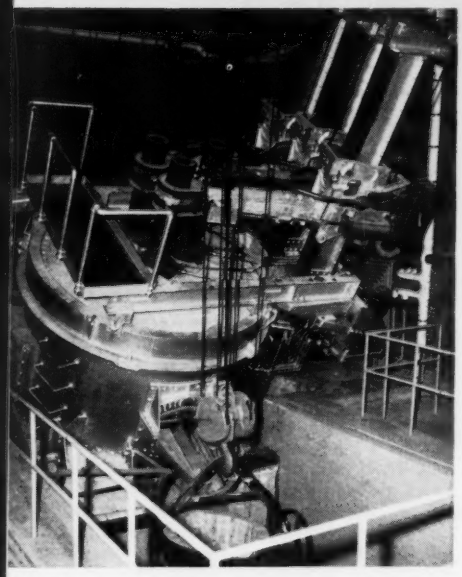
World's largest producer of secondary nickel alloys of certified analysis

Circle 617 on Page 51

SWINDELL

SINCE 1850

FOUNDRY ELECTRIC MELTING FURNACES ENGINEERED AND BUILT TO HIGHEST STEEL MILL STANDARDS



Swindell Electric Melting Furnaces for foundry service provide the productivity, low maintenance and long useful life built-in by genuine steel mill design and construction by steel mill melting furnace specialists. Write for a consultation.

Typical Quality Features

- **RUGGED, OVERSIZED ROOF CYLINDER** in permanent engagement with roof superstructure insures proper sequence. No manual clamps or kingposts—no special foundation. Cylinder is powered to level pyramided charged scrap in seconds.
- **SIMPLE, LOW COST FOUNDATIONS.** No cable tunnels or elaborate cable reeving—electrode hoist and roof cylinders are integral with furnace for proven maximum "on the line" performance.
- **INSTANTANEOUS ELECTRICAL RESPONSE.** Split-second control of melting is provided by Swindell service-certified electrical system.
- **REMOTE CONTROLLED ELECTRODE HOLDERS.** All vital parts out of heat and danger zone—yet accessible for quick visual inspection or maintenance.
- **4-POINT ROOF SUSPENSION.** Eliminates warpage; roof floats. Roof-change in minutes. An original SWINDELL development.
- **OVERSIZED I-BEAM ROOF RINGS** of Swindell design. Generous inside diameter to prevent damage to ring and refractory skewback. Built from true structural I-beam—no welds inside to fail from thermal shock. All welds outside to prevent cooling water reaching hearth area in event of damage.
- **BALANCED MELT-DOWN ECONOMY.** Optimum melt-down speed is integrated with correct KVA rating and furnace diameter for each furnace size, providing maximum performance without penalty in refractory and maintenance costs.

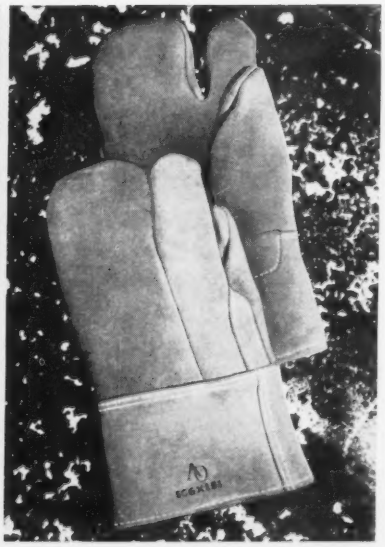
WRITE for your copy of the latest Swindell Electric Melting Furnace Catalog — sent promptly on request.

SWINDELL-DRESSLER
CORPORATION
Designers and Builders of Modern Industrial Furnaces
PITTSBURGH 30, PA.

Protection from Heat

These AO
Specially Tanned Cowhide Quality
Heat Gloves and Mittens Give You Both! . . .

High Heat Resistance Longer Wear



AO SC5X166 HEAT GLOVE. Chrome tanned split cowhide leather, specially tanned to resist heat. Clute cut. Heavily lined for extra heat insulation. Reinforcing leather strap around crotch of thumb. 4″ leather cuff, lined.

AO SC6X151 ONE-FINGER MITTEN. Chrome tanned split cowhide. Heavy lining makes splendid heat barrier. 4″ leather cuff, lined. NOTE: Also available in full mitten as AO SC6X180.

A glove or mitten that will wear longer is always a good buy. A glove or mitten that gives top protection against heavy heat exposures *plus* longer wear is an even better buy!

The American Optical heat gloves shown are *best values* for operations involving heat where hard wearing qualities, not found in asbestos* are required — such as die casting, drop forging, block bending in shipyard work, steel mill coil tying and similar jobs. These gloves and mittens are specially tanned cowhide, feature full heavy liners and can also be ordered with *heavy lined duck cuffs* in lieu of leather, thus offering additional savings. Buy the best . . . It costs no more! Your nearest American Optical Safety Products Representative can supply you.

*American Optical high heat gloves will handle many foundry operations as well as asbestos and are considerably lower in price.

American Optical Sweatbands increase worker comfort and efficiency, decrease accidents. Check your needs!

Always insist on AO trademarked Safety Products

American Optical COMPANY
SAFETY PRODUCTS DIVISION

SOUTHBRIDGE, MASSACHUSETTS
BRANCHES IN PRINCIPAL CITIES

Circle 619 on Page 51

nifty...

Swim suit by Jantzen

thrifty!

The finest malleable shot and grit on the market

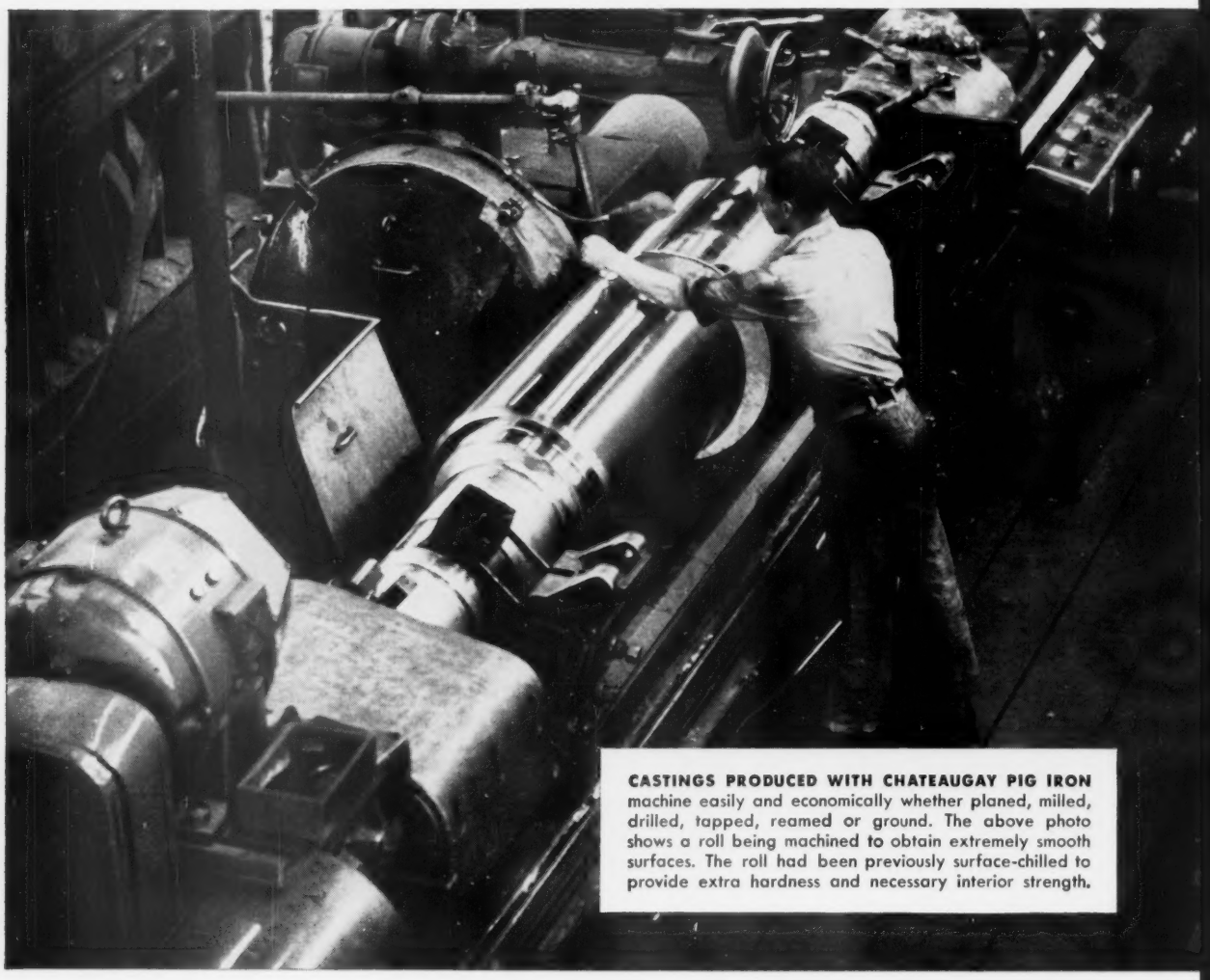
METAL BLAST, INC.

872 EAST 67th STREET · CLEVELAND 3, OHIO

Circle 620 on Page 51

Exclusive Chemistry of Chateaugay Pig Iron

HELPS FOUNDRYMEN MEET EXACTING



CASTINGS PRODUCED WITH CHATEAUGAY PIG IRON machine easily and economically whether planed, milled, drilled, tapped, reamed or ground. The above photo shows a roll being machined to obtain extremely smooth surfaces. The roll had been previously surface-chilled to provide extra hardness and necessary interior strength.

REPUBLIC

REPUBLIC STEEL

World's Widest Range of Standard Steels

REQUIREMENTS

For more than 50 years, foundrymen have used Republic Chateaugay Pig Iron to help them lick the tough casting jobs. They know Chateaugay's properties and characteristics are unequalled by any domestic pig iron. They also know that Chateaugay can be depended upon to meet the most exacting casting requirements.

The rolls used in the manufacture of paper, plastics, rubber, metals of all kinds, steel, copper, brass, aluminum, even breakfast cereals, are a good example of how Chateaugay lives up to its reputation.

Foundries producing these rolls have found Chateaugay the ideal pig iron to use in meeting the demands for hard, wear-resisting surfaces; for strength; for heat-resistance; for machinability.

One foundryman put it this way: "Chateaugay is indispensable in this application because of its finer graphite structure and grain refinement. The exclusive inherent chemistry of Chateaugay tends to nucleate the fine graphite flakes, producing a finer, condensed grain structure that gives the rolls increased strength and wear-resistance."

This fine dense grain structure also provides excellent and economical machinability and reduces scrap loss to an absolute minimum.

Chateaugay offers other superior characteristics which make it ideal for a wide variety of casting applications. It is an exceptionally fluid iron—cools evenly—fills adjoining light and heavy sections completely—produces tough, sound castings accurate to patterns and shapes.

A Republic Pig Iron Metallurgist will be glad to show you how the advantages of Chateaugay, the low-phosphorus, copper-free Pig Iron, can be applied to your production. How the year-in, year-out uniform chemistry of Chateaugay can help you produce consistently high quality castings. Mail the coupon today. There's no obligation.

MEETS STRENGTH REQUIREMENTS TO WITHSTAND ENORMOUS WEIGHTS—Republic Wedge-Lock Steel Shelving is specifically designed for high stacking of such heavy items as castings, dies, tools, etc. Joints actually get tighter as weight increases. There's no distortion or instability. Wedge-Lock Steel Shelving also provides maximum loading in minimum floor space and assembles quickly and easily. Send coupon for more facts.

MEETS STRONG CONSTRUCTION REQUIREMENTS—Republic Materials Handling Equipment assures long, efficient service at lowest per-year cost. Illustrated is the PB-127 Collapsible Box, ideally suited to shipping castings and other heavy items. It is designed for heavy-duty service. It can be tiered when loaded or empty, collapsed or set up. All parts are permanently attached. Offers up to 66% saving in storage space. Write for facts.

STEEL

and Steel Products

REPUBLIC STEEL CORPORATION
DEPT. C-2919A
3132 EAST 45TH STREET • CLEVELAND 27, OHIO

☐ Please have a Pig Iron Metallurgist call.

Send more information on:

☐ Wedge-Lock Steel Shelving

☐ Collapsible Boxes

Name_____ Title_____

Company_____

Address_____

City_____ Zone____ State____

Circle 621 on Page 51

MEASURE HEAT ACCURATELY with

the improved

PYRO OPTICAL PYROMETER

The only self-contained direct-reading optical pyrometer for quick temperature measurements of molten iron, steel, monel, etc.

Send for catalog No. 85.

the improved

PYRO SURFACE PYROMETER

Rugged, easy to read. Ideal for shell molding, core oven, mold and die surface temperature measurements.

Send for catalog No. 168.

PYROMETER INSTRUMENT CO., INC.
BERGENFIELD 6, NEW JERSEY

Circle 622 on Page 51

Readers' Comment

The Design Engineer

TO THE EDITORS:

We read with a good deal of interest your article by Byron L. Ertsgaard, assistant chief engineer, Toro Mfg. Co. of Minneapolis, Minn., on "A Design Engineer Looks at Casting Salesmen."

Would like to have ten copies of this article if available.

E. VESELIK
Vice President
Calumet Steel Castings Corp.
1636 *Summer St.*
Hammond, Ind.

●

TO THE EDITORS:

We are particularly anxious to get two or three reprint copies of the article by Byron Ertsgaard entitled "A Design Engineer Looks at Salesmen." This article appeared in the September issue of FOUNDRY and we believe that it is tremendously apropos and a distinct service to the foundry industry.

G. W. PHELPS
Otaco Ltd.
Orillia, Ont.

More Sandslinger History

TO THE EDITORS:

In reading the August issue of FOUNDRY I came across Harold Henderson's article on Sandslingers in which he stated he could not find out who received the first machine built by Beardsley & Piper.

I think I can solve this problem because I think James B. Clow & Sons at Coshocton, Ohio, had the first Slinger built. Mr. Piper came to our Coshocton plant to help us run the machine and also to work out some of the kinks in this new way of ramming molds.

We got this machine sometime in 1919 or 1920. We now have stationary and motive type Slingers, and there is of course no comparison and very little resemblance to the original machine.

Hope this may help to clear up this Sandslinger history.

GUSTAV KRATZ
Foundry Superintendent
James B. Clow & Sons Inc.
Coshocton, Ohio

Marketing Article Popular

TO THE EDITORS:

Congratulations on 65 years of fine co-operative service to the foundry industry.

FOUNDRY and I have had a lot in common over the past years and I, in my small way have tried to repay the help that the magazine has given me in submitting the many articles which you have seen fit to publish.

The article recently published in your fine paper by Dick Meloy on the "Marketing of Castings" in which he saw fit to mention the little "Technical Booklet" we put out has had a wonderful response. We have received over 100 requests, 16 of which have been from foreign countries, which is proof of how wide a field the FOUNDRY covers.

By the way, we also celebrated our tenth anniversary on July 30, having grown to five times our start in 1947.

WILLIAM S. THOMAS
Vice President
Emmaus Foundry & Machine Co.
Fourth and Furnace Sts.
Emmaus, Pa.

The Birthday Issue

TO THE EDITORS:

Congratulations on the 65th anniversary of FOUNDRY. We have read it for many years with considerable interest and, of more importance, benefit. I am sure that everyone in the industry has a high regard for the publication and you men who have made it.

ROBERT J. PAINTER
Executive Secretary
American Society for Testing Materials
1916 *Race St.*
Philadelphia 3, *Pa.*

●

TO THE EDITORS:

I have just been looking through the September 1957 issue and have read with considerable interest your editorial on page 95. There you state that the September, 1957, issue is the 65th birthday issue of FOUNDRY magazine.

May I here congratulate the Penton Publishing Co. and members of your staff on the excellent work that you have done in the interim of that 65 years.

John A. Penton may have had the vision, but you are the people who have made it a reality. My congratulations to you.

NORMAN F. HINDLE
Head
University of Idaho
Mechanical Engineering Department
Moscow, Idaho

1150 tons in a 21-day period!

"We really whoop it to our Lectromelt* Furnace," reports Omaha Steel Works who have a CQT Lectromelt nominally rated at 2.2 tons per hour output

12 to 13 heats per day, in 18 to 19 hours of furnace operation; that's the stiff schedule on which Omaha Steel Works of Omaha, Nebraska works. They've produced as high as 1150 tons in a 21-day period—metal meeting the highest standards for quality and uniformity.

That's the advantage of working with a Lectromelt furnace. Analyses can be adjusted with extreme accuracy. Temperatures are held just right for casting.

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Catalog 9-B describes these furnaces. For a copy, write Lectromelt Furnace Division, McGraw-Edison Company, 314 32nd Street, Pittsburgh 30, Pennsylvania.

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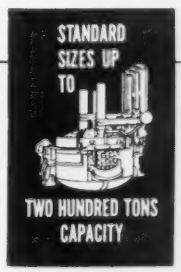

Circle 623 on Page 51

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Circle 624 on Page 51

It Takes Both

Why do foundrymen turn out in droves for programs featuring almost any type of production problem, such as melting practice, coremaking, sand preparation, or shell molding? And why does only a corporal's guard show up for an excellent program on important phases of marketing?

These questions were raised recently by a leader in the foundry industry who was trained and gathered business experience in other fields, but has spent recent years serving foundries. He is of the opinion that in today's competitive economy, intelligent selling is just as important as controlled production. He is absolutely right.

Emphasis on production goes back many years to the time when practically all owners and managers of foundries came up through the plant. Market areas were local in character, and foundrymen thought that if they could make castings, somebody would buy—at a price.

Times have changed. Market areas are much broader. Competition is much greater because other methods of fabricating metals have made progress. Today it is necessary for this industry or any industry to fight for its fair share of an expanding market.

Of course, production is just as important as ever. The first prerequisite to a successful foundry operation is the production of a first-class casting that will meet well the need for which it was designed.

But of equal importance is intelligent selling. Management must pay more attention to modern marketing methods if the company is to stay in business.

Castings have many qualities that provide advantages to users in many fields. Let's see that these are exploited properly through really intelligent selling.

Frank G. Steinebach

Editor

Since ductility factors of the tension test underevaluate cast metals, foundrymen should be interested in the author's . . .

The Case Against

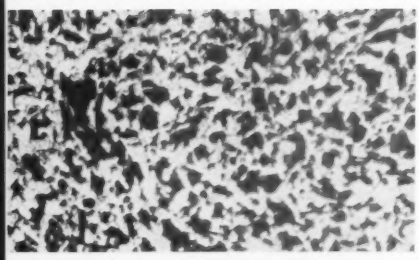


Fig. 1a—Type 1030 cast steel, normalized. Ten str 81,200 psi, yld str 45,000 psi, elong 28.0 per cent, R. A. 44.2 per cent, ductile to brittle fracture transition temperature 15° F

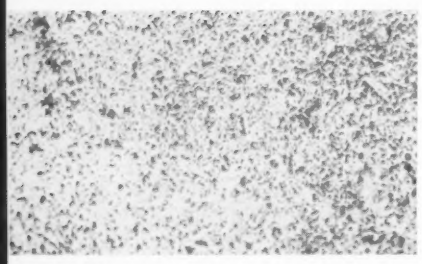


Fig. 1b—Type 1030 cast steel, water quenched, tempered. Ten str 88,700 psi, yld str 57,200 psi, elong 23.5 per cent, R. A. 54.0 per cent, and transition temperature −40° F

Fig. 1c—Type 4330 cast steel, water quenched, tempered. Ten str 130,000 psi, yld str 105,000 psi, elong 15.0 per cent, R. A. 58.6 per cent, and transition temperature under −100° F

THE FOUNDRYMAN has a selfish interest in the case against the tension test. His cast metals cannot compete with wrought metals on a quality basis when compared and evaluated by the elongation and reduction of area features of the tension test.

He should be an active exponent in de-emphasizing the tension test because the ductility factors of the test underevaluate cast metals. His selfish campaign can be of great value to the user of metals in proving that these same ductility factors overevaluate wrought metals. This overevaluation of wrought metals is much more dangerous than the underevaluation of cast metals.

The mechanical engineer has been taught for generations that elongation and reduction of area of the tension test measure "ductility" and that the higher these values, the "tougher" the metal. Cast metals show lower elongation and reduction of area than their wrought counterparts. Therefore, the designer and the engineer have been taught to consider them second-class materials. This teaching has been stressed to the degree that many foundrymen accept this stigma.

Brittle Failures Numerous—During the entire period that this doctrine of tensile ductility and toughness has been taught, evidence has been piling up that almost the reverse is true—the fact that ductility in the tension test does not insure ductility of the part in service. Since 1879 (the first recorded instance of brittle failure of a metal showing high-tensile ductility), there have been hundreds of catastrophic brittle failures of structures made of metal of high-tensile elongation and reduction of area. For each of these catastrophic failures that hit the headlines or the courts of law, there have been thousands of minor failures.

Shank[1] recently reviewed this situation. He lists the following incidents as an incomplete list of catastrophic brittle failures:

1879—A Mr. Barnaby and a Mr. Kirk both complained about brittle fracture, as recorded in the *Journal* of the Iron and Steel Institute. Mr. Barnaby complained that "recent cases have occurred of fractures in bessemer bars . . . from some trifling blow or strain . . . They nearly all took place during the late severe winter at Chatham." Mr. Kirk complained about a steel plate "when cold, on being thrown down split right up. Pieces cut from each side of the split stood all Admiralty tests. Now given a material capable of standing without breaking an extension of 20 per cent, how

By JOHN B. CAINE
Technical Consultant
Cincinnati

the Tension Test

could a plate split with very slight extension . . . not to the extent of 1 per cent." Mr. Barnaby was roundly denounced. Mr. Kirk was ignored.

1886—A large riveted standpipe at Gravesend, Long Island, failed brittlely on test.

About 1900—Numerous major cracks in riveted ships. The *Leviathan, Majestic* and *Europa* are examples.

1919—Twelve persons drowned or were killed when a 2,300,000-gal riveted molasses tank split open in Boston.

1938-40—Three welded bridges over the Albert Canal in Belgium failed brittlely.

1943 to date—Over 50 major brittle cracks of welded ships, some ships breaking in two. Hundreds of lives lost. Majority of cracks originated at square hatch corners and square cutouts.

1943 — Welded spherical pressure vessel at Schenectady, N. Y., broke into 20 pieces. Similar failures at Morgantown, W. Va., and in Pennsylvania in March, 1943, and January, 1944.

1944—Catastrophic failure of liquefied methane storage tanks in Cleveland killed 128.

1948 to date—Numerous pipeline failures. One at least is notable in that it probably is the longest crack on record—3200 ft long.

Mr. Shank also records miscellaneous failures of shovel booms, dipper sticks, oil storage tanks, smokestacks and penstocks. The writer would like to add one further example: The failures of the Ambassador and Mt. Hope suspension bridge cables. These failures are noteworthy in that if anything approaches the loading of the tension test, static axial loading of a uniform section, it is a suspension bridge cab'e. Nevertheless the cables broke brittlely, before the bridges were placed in service. Elaborate tension testing could find nothing wrong, as it could not in all these failures.

These failures show a number of points of similarity:

1. In all cases, ductility of the tension test bars was excellent. The ductility at the actual fracture was near zero.

2. The failures occurred during the late fall, winter and early spring when the ambient temperature was under about 50° F.

3. Shock loading was not necessary to cause failure. Most of the failures occurred under static loads. Even so, many of the failures were almost explosive.

4. The fractures were distinctive—shiny crystalline with a herringbone pattern pointing to the point of origin of the fracture in each case.

5. Some type of a crack starter, involving a sharp corner, notch, or a cracklike defect, was present. The crack starter may be large like the square hatch corners of the ships, or be microscopic like the surface defects of the suspension bridge cable wires.

Causes of Failures—Most of the failures would have involved steel for no other reason than that most large structures are made of this metal. All sorts of reasons have been advanced for these failures. At first, converter steel was blamed, then welding. The real reasons—nonuniform microstructure of a body-centered cubic lattice metal, plus poor design, plus poor fabrication, plus cold weather—have not been appreciated until recently. Tensile ductility does not enter the picture. These real reasons require selling. Few persons sell for the joy of selling; an incentive is needed. The foundryman has this incentive, or should have, and can make a contribution to the metal-using industry, even though he is satisfying a selfish interest.

Another reason that Mr. Shank's list is exclusively steel is that carbon and low-alloy steels are body-centered cubic metals and subject to brittle fracture under certain conditions because of their atomic structure. The same is true of any ferrous metal (except the austenitic high-alloy types) and any other metal of the body-centered cubic lattice system. Such metals become brittle at low temperatures when loaded under conditions of stress concentration. The temperature at which they become brittle depends on their microstructure and can vary from above room temperature to below $-150°$ F. Fig. 1 shows three microstructures of steel and their effect on the transition temperature from ductile to brittle fracture.

Although this temperature-dependent brittleness is confined almost exclusively to steels and irons, all metals, with no exception, are prone to another type of brittle failure—fatigue failure. Fatigue failure is influenced by conditions very similar to those which cause sudden low-temperature brittleness. The fatigue strength of the actual part can in no way be evaluated by the tension test.

Re-evaluating the Tension Test—Before we discuss tests that do predict and evaluate brittle behavior, it may be well to re-evaluate the tension test in the light of present knowledge. First, the conditions of the test. Agreed, these conditions are old stuff, but they are too often taken for granted.

The standard tension test tests a smooth, uni-

form specimen, under a gradually increasing axial tensile load, to destruction, within a relatively short time. The loading is considered static. This test evaluates a metal under no other type of loading or in any other shape.

Five properties are derived from the test: Modulus of elasticity, yield strength, tensile strength, elongation and reduction of area.

The first two properties—modulus of elasticity and yield strength—can be used in design and are important. Modulus of elasticity measures stiffness in the elastic range, before the yield strength is reached. This property is constant for any given metal and cannot be changed. Perhaps it is for this reason that it often is overlooked, occasionally with embarrassing or disastrous results. Because this property is constant, it is the same for cast and wrought metals and for any given metal is dependent only on cross-sectional area. Castings can compete with wrought metals on the basis of this property.

Yield strength is the most important property derived from the tension test. It measures in pounds per square inch the limit to which the metal can be loaded statically. Loads over the yield strength cause extensive plastic deformation to the point where the part will not assume its original dimensions when the load is removed. There is no difference in the yield strengths of cast and wrought metals, or parts made from these metals, if the chemistry, heat treatment and microstructure are the same. The foundryman can compete with competitive methods of fabrication on the basis of this property.

Wrong for a Ductile Metal—Fallacious evaluation crops up when the next property, tensile strength, is considered. This property is expressed in pounds per square inch, based on the original cross-sectional area of the specimen. This is wrong for a ductile metal, for the cross-sectional area is appreciably smaller than that measured when the tensile strength is reached. True tensile strengths are appreciably higher than those usually given.

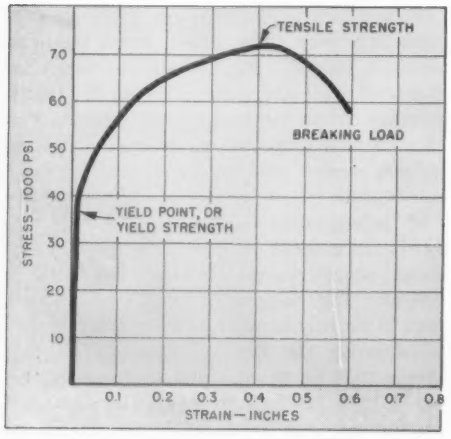


Fig. 2—Quantitative stress-strain diagram for 1030 normalized cast steel. Ten str 71,600 psi, yld str 38,150 psi, elong 29.5%, R. A. 47.5%

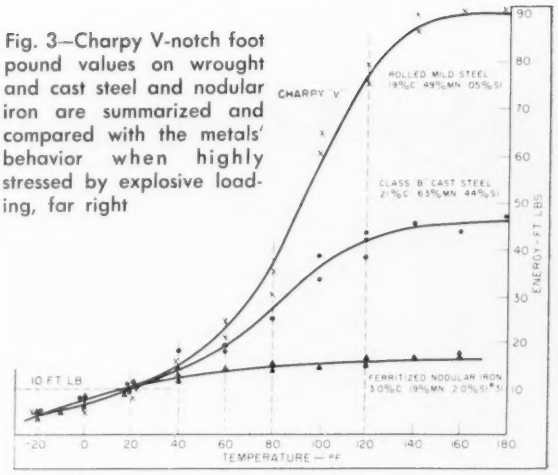
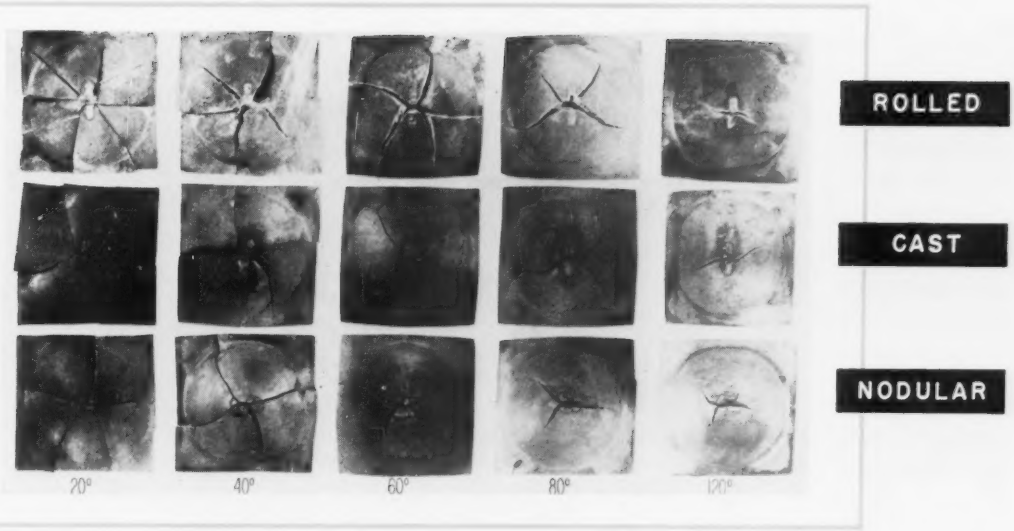


Fig. 3—Charpy V-notch foot pound values on wrought and cast steel and nodular iron are summarized and compared with the metals' behavior when highly stressed by explosive loading, far right

So much plastic deformation has occurred before the tensile strength is reached that, for all practical purposes, this property has no direct significance in the load-carrying ability of a ductile metal, or in design of such metals. Somewhat the same conditions exist for brittle metals, but not to the same degree.

Fig. 2, a quantitative stress-strain diagram of a ductile metal, emphasizes this point. The amount of deformation in the elastic region, up to the yield strength, cannot be shown on rectangular co-ordinates. The line is straight and almost vertical. Very extensive plastic deformation occurs immediately after the yield strength has been exceeded and before the tensile strength is reached. Added to Shank's case against the tension test is the fact that practically all elongation occurs after the yield strength has been exceeded, and practically all reduction of area occurs after the tensile strength has been exceeded and the metal is failing.

If it is agreed that the important tensile properties are modulus of elasticity and yield strength and that tensile elongation and reduction of area do not measure the ability of the part to stay in one piece in service, the question is what test or tests will measure this illusive property "toughness." As mentioned previously, the brittle behavior of steel under certain conditions, regardless of tensile ductility, was recognized back in the 1870s. Not long after, another type of brittle behavior was recognized. At that time, and for years after, the metal was blamed. Metal "crystallized" and failed brittlely, many times, years after the part had been placed in service. The sudden, low-temperature type of brittle fracture seems to have been appreciated first. At least, tests were developed about 1885 to test for this type of behavior; they were the Charpy and Izod notched-impact tests that still are in use. It was recognized at that time that these tests recognize sudden brittle fracture when the tension test does not. It was not until the first quarter of the



twentieth century that fatigue failure was recognized as such and the importance of stress concentration, not "metal crystallization," was appreciated.

A Comedy of Errors—The history of the Charpy and Izod tests during the past 70-odd years is so full of misapplication, misevaluation and miseverything that it truly can be called a comedy of errors. The first erroneous assumption was that rapid load application "impact" was the reason for the difference in behavior. The role of the notch was ignored. This fallacy is still prevalent, as witnessed by the still-used name "impact" and the use, even today, of the "unnotched-impact" test.

About 20 years ago it started to dawn on some investigators that the notch in the "impact" test meant more than just a convenient place to start the break. The notch has grown in importance to the point where it now has been proved that the notch is the major part of the test and the rate and manner of load application are of minor importance. Today, there are a number of tests for toughness employing a notch, applying a bending or axial tensile load as slowly as in the standard tension test.[2,3,4,5] Increasing the rate of load application only increases the temperature of transition from ductile to brittle fracture[6].

Another fallacy still accepted is how to measure the resistance to brittle fracture in the presence of a notch. In the old days of impact testing, the test was made by striking the specimen with a heavy pendulum. Everyone jumped to the conclusion that the amount of force (measured in foot-pounds) required to break the specimen measured resistance to fracture and toughness. It seemed reasonable and logical that the higher the number of foot-pounds, the tougher the metal. Cast metals again suffered in comparison with wrought metals, especially when wrought metals were tested in the direction of working.

Wrong Assumption—This assumption—the higher the number of foot-pounds the tougher the metal—was so logical that it was not challenged until recently. In the 1930s, much testing was done that should challenge, if not disprove, this assumption. If foot-pounds measure the resistance to fracture in the presence of a notch or stress raiser, increasing the amount of metal at the base of the notch should increase the number of foot-pounds required for rupture. The work showed that this assumption is not correct. There is no general relation between the amount of metal to be ruptured and the energy required for rupture. In many instances, increasing the amount of metal decreased the number of foot-pounds required to rupture the impact specimen.

Very recent work has explained this peculiar behavior at least partially. After a brittle crack has started, it becomes self-propagating. The elastic energy of the metal itself is sufficient to keep the crack going at almost explosive speed. Size of specimen and sharpness of the notch, as well as rate of load application, are effective only in changing the transition temperature from ductile to brittle fracture. The actual behavior of the specimen depends on the temperature at which the test is performed in relation to this transition temperature. Possibly modulus of elasticity is the tensile property on which energy of crack propagation depends. Certainly tensile elongation and reduction of area have no influence. Speed of rupture is, however, of only academic importance. What is most important is for the metal to resist the start of the crack.

Requirements for Brittle Fracture—Three requirements must be met before a brittle fracture will occur. If just one is not met, brittle fracture cannot occur.

1. The metal must be stressed, if only momentarily, to above the yield strength so that there is slight plastic deformation. This is a design problem.

2. There must be a point of stress concentration —a notch. This point can be a sharp corner due to design, a sharp fillet or tool mark due to ma-

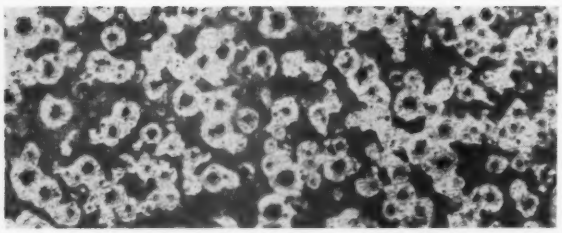


Fig. 4a—Nodular iron heat treated to yield strength specifications. Ten str 68,200 psi, yld str 51,200 psi, elong 14.5 per cent. It has a transition temperature of 65° F

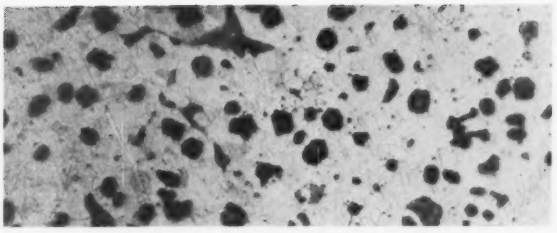


Fig. 4b—Nodular iron heat treated to a low transition temperature. Ten str 62,700 psi, yld str 38,000 psi, elong 23.5 per cent. It has a transition temperature of −55° F

chining or any type of a cracklike defect due to processing the metal.

3. The metal must be notch brittle at the temperature at which failure occurred.

Only the last requirement has to do with the metal. The other two have to do with design and fabrication, subjects beyond the scope of this article.

The foundryman should be interested in the details of the last requirement, for it makes his metals competitive again. Elongation, reduction of area and foot-pounds do not enter this requirement. This is a go or no-go requirement. The metal either is notch brittle or it is not, depending on temperature.

There is one catch—a rather drastic mental revolution is required to accept evaluation of a metal in degrees of temperature. At present, this mental barrier is holding up the acceptance of what seems to be the only proper method of evaluating notch toughness. Therefore this temperature concept needs selling, and the foundryman is a good candidate for the job. His cast metals cannot compete equally on the basis of foot-pounds. These same cast metals can compete on an equal or better footing with wrought metals on the basis of transition temperature from ductile to brittle fracture.

Our sales pitch can best be summarized by Fig. 3. Pellini, Sandoz and Bishop[7] have summarized the Charpy V-notch foot-pound values of three metals—wrought steel, cast steel and nodular iron—and compared these Charpy values with the behavior of the metals when they are highly stressed by explosive loading. At room temperature and above, there is a large difference in Charpy foot-pound values in favor of wrought steel. When large plates are tested under explosive stress, however, all these metals are tough in this temperature range. All the metals fracture, but only when their strength is exceeded, and then they merely split, all to the same degree. As the temperature is decreased, all start to crack more, but again to the same degree, until at subfreezing temperatures, they all shatter, again to the same degree. If anything, nodular iron, the metal which breaks with the lowest number of foot-pounds, shatters at a slightly lower temperature than wrought steel with the highest foot-pound numbers at room temperature.

A Case in Point—This relationship has many implications and applications. For example, the nodular iron of Fig. 3 cannot be made to most existing specifications without expensive, untried alloying, or heat treatment. Present nodular iron specifications specify yield strengths that are too high for the uniform ferritic, low-silicon, low-phosphorus microstructure that is mandatory for a nodular iron that will resist brittle fracture at subzero temperatures if the casting is poorly designed or fabricated.

Fig. 4 shows some microstructures of nodular irons. One meets present yield-strength specifications at a sacrifice in notch toughness, another is notch-tough at subzero temperatures at a slight sacrifice in yield strength. At present, the foundryman is resisting a change away from tensile specifications to the same degree as the consumer. He should be selling the change, which is one that will enable him to get the jump on his competition.

Another example has to do with malleable iron. Sandoz, Howells, Bishop and Pellini[8] list the ductile-brittle transition temperatures of Table I that show that low-phosphorus malleable iron is notch-tough down to temperatures that can be equalled only by quenched alloy steel. However, they comment as follows: "While low phosphorus is desirable for maximum notch ductility properties, Table I indicates that it might be difficult to meet present tensile specifications with irons having very low phosphorus contents."

TABLE I—Transition Temperatures

Material	Transition Temp. from Ductile to Brittle Fracture (NDT) °F.
Malleable iron (ferritic)	−60 to −10
Pearlitic malleable, best grade	+10 to +70
Semikilled mild steel	
¾ to 1 in. plate	0 to +60
Fully killed mild steel	
As rolled	0 to +20
Normalized	−30 to 0
Cast steel, class B normalized	0 to +20
Alloy steel, cast or rolled, quenched and tempered	−150 to −60
Ferritic nodular iron	
Average silicon	+40 to +60
Low silicon, low phosphorus	−60 to −40

The problem with malleable iron is more complex than that of nodular iron. Nodular iron can be made notch-tough down to temperatures sufficiently low for all atmospheric usages with only a slight sacrifice in yield strength (5000 to 10,000 psi). Such nodular irons still possess yield strengths equal to comparable, competitive steels. Then, too,

as discussed later, the presently specified high yield-tensile strength ratios for nodular iron cannot be used in any design involving cyclic loading. The ferritic malleable irons of Table I show yield strengths under 30,000 psi—lower than competitive wrought steels. Here is a challenge to the malleable iron foundryman. Develop a ferritic notch-ductile malleable iron with a yield strength about 10,000 psi higher than the ferritic malleable irons of Table I. Such irons would be competitive with higher priced quenched alloy steels. They cannot be developed by slaves to the tension test. Notch ductility must be considered a requisite equal in importance to yield strength.

Heat Treatment Corrected—Steel castings have just gone through a similar situation. For years liquid quenching of steel castings was prohibited. The insistence on annealed or normalized cast steels in specifications forced the production of castings which were potentially notch-brittle if subjected to subfreezing temperatures and if poorly designed. This was especially true as carbon content and casting size increased. The prohibitions of liquid quenching finally have been overcome. Hardenability specifications to insure notch-tough uniform microstructures finally are in the offing. Notch testing, however, still is not standardized. Here is another opportunity. There now are a number of test methods and test specimens capable of measuring this important property of notch toughness. Some are more applicable to castings than others. The foundryman can use this opportunity to sell a test specimen and method best suited to his needs and conditions with a better chance of acceptance than after this situation has become stabilized.

The foundry industry in general, and the steel foundry in particular, still has to capitalize on its ability to produce notch-tough, liquid-quenched, low-alloy castings more economically than their wrought counterparts can be produced.

Important as notch-brittle fracture is, it must take second place, economically at least, to fatigue fracture. The situation is analogous to polio and the common cold. Polio and sudden notch-brittle fracture are dramatic and make the headlines. Fatigue fracture and the common cold are accepted as more or less unavoidable evils even though it is probable that their economic loss is of greater magnitude. Fatigue failures are occurring continually. Their numbers, even though each failure is relatively undramatic, add up. Notch-brittle failure and fatigue failure have a number of points in common, and they also differ significantly in a number of points:

Points in Common

Both require a point of stress concentration—a sharp corner, nick, or crack that is improperly positioned and directioned.

Failure occurs with practically no deformation regardless of the tensile ductility. Therefore, the elongation and reduction of area features of the tension test have no significance.

Points of Difference

Notch Brittle Fracture	*Fatigue Fracture*
Very temperature-dependent if the metal is subject to this type of fracture.	Temperature is not a variable. All metals are subject to this type of fracture.
Dependent on the atomic and microstructure of the metal.	Independent of the atomic and microstructure of the metal.
A relatively high load, usually enough to exceed the yield strength, is necessary to initiate fracture. Only one, momentary application of the high load is necessary.	Fracture can occur at loads much below the yield strength. Many applications of the critical load necessary to cause fracture—up to several million.
Yield strength is the important property. Its significance is minor.	Tensile strength is the only significant tensile property. Its significance is minor.

The above tabulation emphasizes the importance of stress concentration in fatigue. Metals can be made resistant to notch-brittle fracture even though a notch or stress raiser is present. Some metals, like aluminum and the austenitic steels, are immune. This cannot be said for fatigue fracture, to which all metals are subject. Tensile strength can be increased causing a theoretical increase in fatigue strength. This increase usually is illusionary, for notch sensitivity in fatigue increases as strength and hardness increase. This imposes a limit in practical dynamic design that must include a factor of safety, above which the part cannot be stressed. This point usually is appreciably below the yield strength of the metal, whether cast or wrought.

This point is forgotten too often, even by the designer. Yield strength can be used with or without a factor of safety only in static design. If there is any cyclic loading, yield strengths, especially those over 50 per cent of the tensile strength, can be misleading. What seem like low loads, based

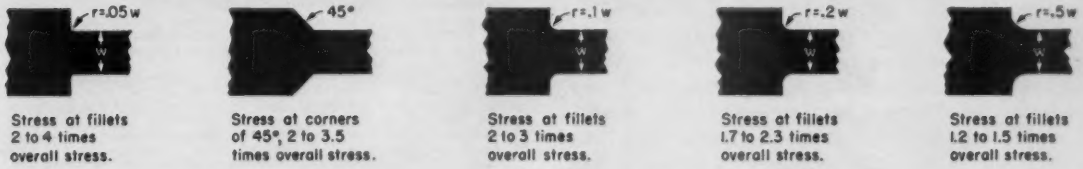

r=.05w
W
Stress at fillets 2 to 4 times overall stress.
45°
Stress at corners of 45°, 2 to 3.5 times overall stress.
r=.1w
W
Stress at fillets 2 to 3 times overall stress.
r=.2w
W
Stress at fillets 1.7 to 2.3 times overall stress.
r=.5w
W
Stress at fillets 1.2 to 1.5 times overall stress.

Fig. 5—Reduction of stress concentration due to streamlining junctions of sections

on yield strength, can exceed the fatigue strength. Occasionally a load system that to all appearances is static can be dynamic and subject to cyclic loads. The writer has experienced several such instances in the last few years, especially with pressure-containing parts. Hydrostatic pressure, for example, is considered static loading. However, if hydrostatic pressure is maintained with a pump, as most are, hydraulic pound can be the cause of rapid cyclic loading. A number of fatigue failures have been experienced in such systems which, when analyzed, were due to exceeding the fatigue strength, even though the loads were under the yield strength.

The criticism expressed previously regarding high yield-strength specifications at a sacrifice of other properties is based on this thesis. The maximum fatigue-tensile strength ratio for a polished, symmetrical specimen is about 50 per cent of the tensile strength. Almost any fillet, corner or unstreamlined change in section can reduce the actual fatigue strength of the part to 25 per cent of the tensile strength, as shown in Table II.[9] If a part is designed to yield strength, with

TABLE II—Decrease in Fatigue Strength Due to Polished Fillets

Fillet Radius	Alloy Wrought Steel 137,500 psi Tensile Strength: Fatigue Strength psi	Alloy Wrought Steel 137,500 psi Tensile Strength: % of Tensile Strength	25ST Wrought Aluminum 60,000 psi Tensile Strength: Fatigue Strength psi	25ST Wrought Aluminum 60,000 psi Tensile Strength: % of Tensile Strength
9.85 in. (standard fatigue specimen) ..	55,000	40	14,000	23
¼ in.	45,000	33	.....	..
⅛ in.	42,000	31	13,000	22
1/16 in.	36,000	26	10,000	17
1/64 in.	24,000	18	8,000	13

Note—The decrease in fatigue strength if fillets are not polished will be greater[9].

a factor of safety of 2.0, using a metal with a yield-tensile strength ratio of 0.80, it will be stressed to 40 per cent of the tensile strength.

Unless the part is designed with very large fillets and the fillets are polished, it will be stressed to above its fatigue strength regardless of the metal and the method of fabrication. In these instances the high yield strengths of the tension test are dangerously illusionary.

They Have Their Place—This observation does not mean that specifications should exclude metals with high yield-tensile strength ratios. Such metals are useful for static load design and precise dynamic design. If certain dynamic properties can be obtained cheaply at slightly lower yield-tensile strength ratios, however, metals possessing these properties should not be excluded from specifications, as they are now. The foundryman should sell these metals as offering cheap, notch-tough parts not requiring high strength.

Here is where castings shine. The cardinal point in design for resisting both sudden brittle fracture and fatigue fracture is eliminating points of stress concentration. There is no forming process capable of producing streamlined parts, parts with the large radiuses that are necessary to reduce stress concentration to a minimum that can come near the capability of the casting process. If stress concentration can be reduced by half (this is not at all difficult with large radiuses in fillets and changes in section), the actual load carrying ability of the part is doubled. Fig. 5 shows some simple but typical examples.[10, 11]

From the standpoint of fatigue strength, gray iron enters the field of ductile metals. If properly designed it can, in many applications, outperform ductile metals. Notch sensitivity (gray iron is quite insensitive to notches), damping capacity, corrosion resistance—properties far afield from tensile properties—become the important evaluating properties. The copper-base alloys and corrosion-resistant steels now can outperform higher-strength metals under cyclic loading in any kind of corroding atmosphere (moist air is enough) unless the less corrosion-resistant, higher-strength metal is carefully protected against corrosion. This requirement means more than just slopping on a coat of paint. Under these conditions, all tensile properties, even yield strength, become unimportant.

True, this is design, not founding, and many foundrymen reject these concepts as none of their business. However, selling this type of design, even just the basic concepts of such design, will sell castings where castings have not been sold before. There can be no founding unless castings can be sold, and sold in increasing quantities.

Shifting the Accent—This concept shifts the accent of quality from the test bar that is thrown away to the casting that is used. The accent shifts from the metal to defects in the metal, for it is these defects, if positioned and dimensioned incorrectly, that radically decrease the true service strength of the part. This is true regardless of how the part is shaped. The foundryman should welcome the new nondestructive testing techniques as methods of proving that his castings will take abuse. Here again, casting has an advantage over competitive forming methods when all the shouting is over and the dust has settled. All metal shapes are imperfect; it is a matter of relative perfection or imperfection.

At any level of perfection, castings have the advantage, for most defects inherent to castings are dispersed and rounded and cause much less stress concentration than equivalent wrought metal defects which are almost always cracklike and cause maximum stress concentration.

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New Chevrolet Plant

Diecasts Transmission Parts

The automotive industry is discovering that diecasting can be an economical, mass-production method where long production runs are required and can be maintained. Diecastings are gaining increased acceptance as efficient equipment is coupled with an engineered production layout

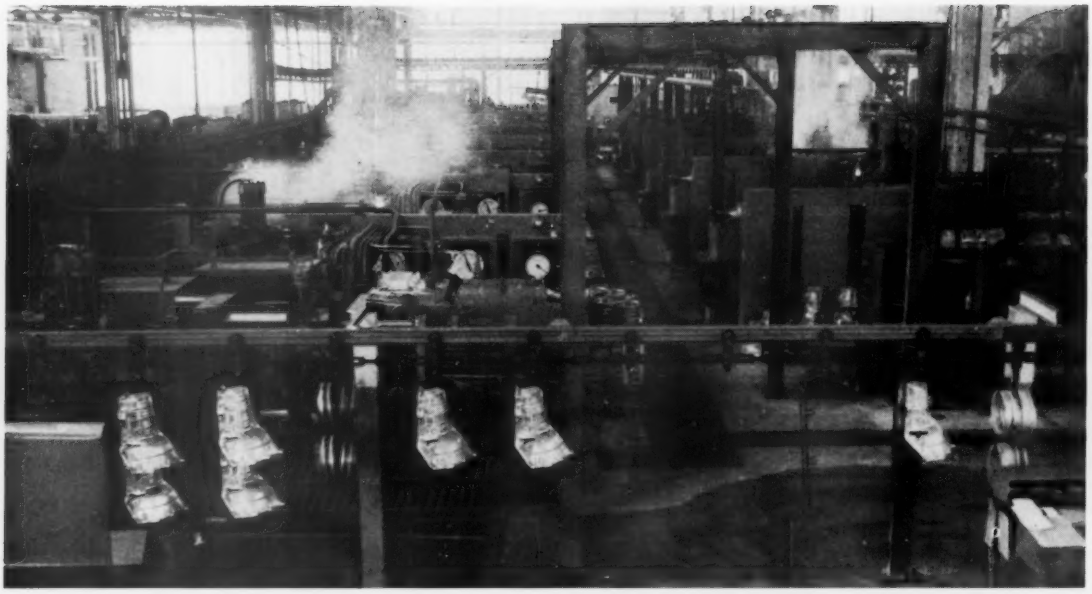
By KENNETH L. MOUNTAIN
Associate Editor

A CONVEYORIZED, automated production system for diecasting components for the Turboglide automatic transmission has been integrated into the manufacturing facilities of the Passenger Transmission Plant, Chevrolet Motor Division, General Motors Corp., Toledo, Ohio.

In addition to the diecasting operation, the new plant contains complete design, engineering, forging, stamping, heat treating, assembly, testing, shipping, and related facilities to provide Chevrolet's 12 assembly plants with this transmission—a triple-turbine transmission with infinitely variable ratio characteristics that produce an uninterrupted driving force at all speeds.

In recent years, larger diecasting machines, faster casting cycles, and higher locking and injection pressures have improved soundness and quality of diecastings. Thin-wall sections, close tolerances, good physical properties, unlimited numbers of cast-in cored holes, reduced weight, ease of machinability, and adaptability to automatic production processes are factors prominent in the rapid advance and acceptance of diecastings for automotive use.

Casting Machine—These latest advances are exemplified in the equipment and in the diecastings being made at Toledo. Fourteen aluminum diecasting machines (nine 600-ton units, three 750-



Diecasting machines are arranged in two lines, with an overhead conveyor system traversing the center aisle to move metal from melting to holding units

ton units, and two 1200-ton units) are producing ten castings weighing from about ¼ lb (neutral clutch cone ring) to 13½ lb (transmission case) when trimmed. Twenty-one men work a two-shift, five-day week to meet the production demand. Total plant employment is about 2000 persons.

Twelve of the fourteen diecasting machines, each having its own holding furnace, are arranged in two lines with an overhead conveyor system traversing the center aisle so that metal can be moved rapidly from the melting to the holding furnaces. The two larger diecasting machines are set slightly to one side to be nearer their source of metal supply. Future production requirements dictate that additional machines will supplement this line.

Each of the machines (with the exception of the 1200-ton units) has its own trim dies adjacent to it; when the castings are trimmed, the excess metal falls to a short, endless conveyor belt that moves outward from the center toward an under-the-floor conveyor belt. The latter belt returns the metal to the remelt furnaces at the end of the line.

Melting Department—Metal is melted in either of two 2400-lb capacity (1800-lb-per-hr output) tilting furnaces or a continuous melting furnace of 3500-lb-per-hr capacity. While the tilting furnaces can melt either remelt or virgin ingot, they are operated at present on a 40 per cent virgin and 60 per cent remelt basis. Laboratory analysis of metal has been held within required limits consistently. The large continuous melting furnace melts only virgin ingot.

Incoming ingot as well as material in process are checked regularly to make sure that specifications are met and maintained. Slugs are cast in molds at regular periods and sent to the laboratory for checking.

Two aluminum alloys are used. One contains this chemical composition: Cu 3.0-4.0, Si 7.5-9.5, Sn 0.3 max, Zn 1.0 max, Ni 0.5 max, Fe 2.0 max, Mn 0.5 max, Mg 0.1 max. All other elements, 0.5 max. Remainder is high-purity aluminum. This alloy will produce castings with 43,000 psi tensile strength, 25,000 psi yield strength, elongation of 2 per cent in 2 in., and a Charpy value of 3.2 ft-lb.

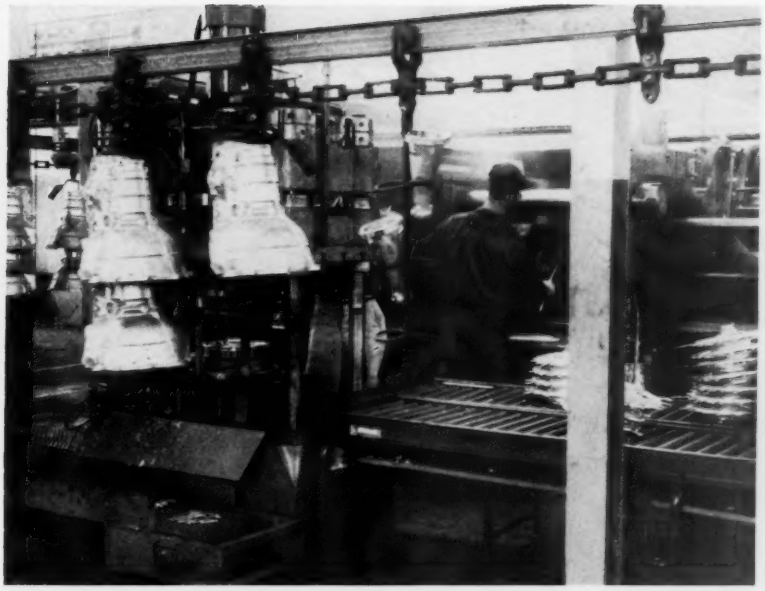
The other alloy contains Cu 0.6 max, Si 9.0-10.0, Sn 0.1 max, Zn 1.0 max, Ni 0.5 max, Fe 2.0 max, Mn 0.3 max, Mg 0.4-0.6, others 0.2 max. Remainder is high-purity aluminum. This alloy will produce castings with 43,000 psi tensile strength, 20,000 psi yield strength, elongation of 5 per cent in 2 in., and a Charpy value of 4.2 ft-lb.

Metal is tapped from the furnaces into 1000-lb ladles carried on the previously mentioned overhead tramrail system and poured into holding furnaces on each unit. The holding furnaces are two-compartmented, automatic pouring units with capacity for 1340 lb of metal. A 2-lb pressure is maintained in each unit, and it varies slightly as the metal is reduced.

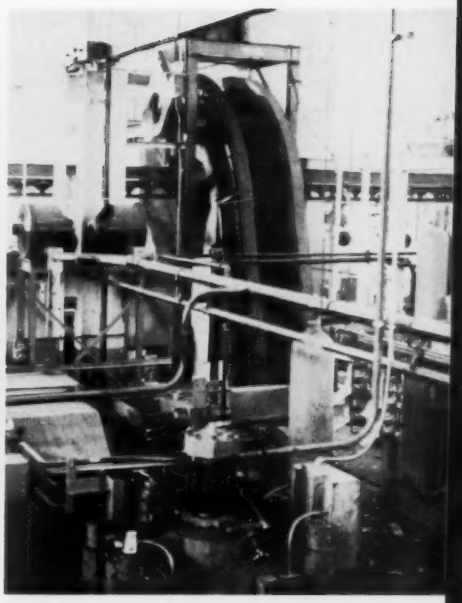
An automatic lubricating system on each machine lubricates the cylinder so the operator is given ad-

Die Cast Parts for the Transmission

Part	Number of Cavities In Die	Weight As Cast (lb)	Weight Trimmed (lb)
Extension	1	3.5	2.54
Brake piston	4	5.0	0.8629
Case	1	17.0	13.5
Turbine converter	1	3.5	2.65
By-pass valve body	4	2.0	0.22
Neutral cone piston	3	2.0	0.518
Neutral clutch cone ring	4	2.0	0.23
Reverse cone piston	2	2.25	0.937
Reverse cone ring	2	2.0	0.297
Forward cone ring	2	2.0	0.352



Trim presses are located adjacent to each machine and, after trimming, the castings are put on special conveyors



Elevators at ends of two under-the-floor endless conveyor systems dump flash into melting units

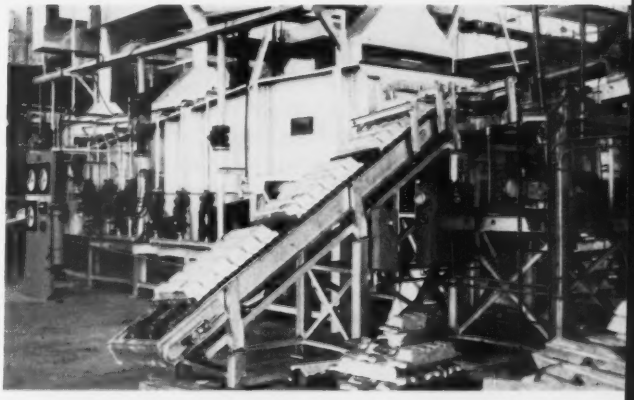
ditional trim time. Each unit is a one-man operation.

Casting Cycle—In actual operation, the operator closes the safety door manually and actuates the die close button. Operations then are performed automatically on time cycles predetermined by the size of castings being produced. A predetermined amount of metal is injected into the die, the die opens after the casting has set, and a light on the outside of the machine indicates that the cycle is completed. The safety door is opened, the casting is removed, visually inspected for obvious defects, and placed on the trim die. The safety door is closed again and the cycle repeats while the operator trims the previous casting.

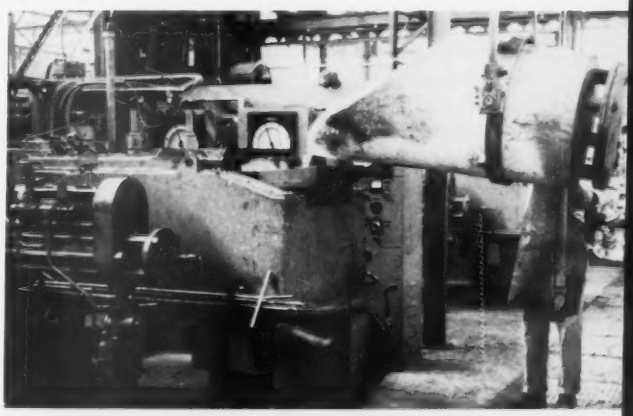
Each operator is responsible for his own production. After trimming, larger castings are hung on specially-designed conveyor racks. Smaller castings are trucked in tote boxes to further finishing operations. The conveyor moves through the diecasting department and proceeds across an outside court, carrying castings to final finishing and assembling operations.

A mixture of Alundum stone, detergent abrasive compound, steel slugs, and water is used in tumbling barrels to remove excess flash and burrs from the T2 turbine casting.

An aging furnace operating at 440° F is used for stress relieving the turbine castings. Wire baskets handle 30 turbines during a 3½-hr cycle. This operation relieves stresses occasionally set up during removal of the casting from the die. The stress-relieved castings also are placed on suitable

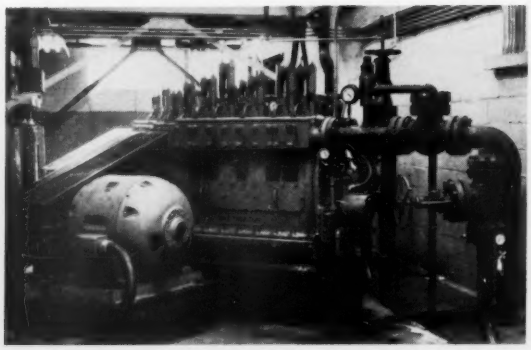


One of three melting furnaces is a specially designed 3500-lb-per-hr continuous melting unit



Metal is transported in 1000-lb ladles to the holding furnace that is part of each machine

Removing a transmission case casting from 1200-ton machine. Note minimum amount of flash



Three 150-hp motors pump 202 gal of soluble oil and water per minute at 1200-psi constant pressure to all machines

hooks on the conveyor and moved to later processing operations.

A central hydraulic system containing three pumps powered by 150-hp motors pump 202 gpm of water and soluble oil at a consistent 1200-psi pressure with no line pressure drop. A 16-ft-high accumulator bottle in the pumproom is piped directly to the accumulator on each diecasting machine. An air compressor connected with each accumulator provides the necessary cushion to withstand the shock of continuous operation. All water die coolant in the system is reclaimed and recirculated.

Transmission Case—The largest casting made, the transmission case, is the most difficult to produce successfully. It is big (17 lb as cast and 13½ when trimmed) and must be completely sound and pressure tight to carry oil under extreme pressure. General wall thickness is held to 0.150 in. It contains 75 cored holes, some as deep as 1¼ in. Five large, main cores are used to pull the larger, deeper recesses in the casting.

The case is made on a 1200-ton machine that exerts a ram (force) of 617,126 lb on the aluminum injected into the die. The die for the case weighs 17½ tons and the over-all weight of the machine is about 190,000 lb. Tie bar distance is 63 x 72 in. Tie bars are 10 in. diam. The sliding plate is locked with a pair of toggle clamps which provide a maximum die opening of 34 in.

The machine is self-contained and operates with its necessary pumps, valves, accumulators, and piping attached to its base. The shot end contains an intensifier which increases the injection pressure when the mounting resistance slows down the filling of the cavity. This added boost in pressure during the chilling cycle reportedly adds to the soundness of the castings.

This machine, too, is automatic in operation after the operator actuates the die close button. Castings are removed by long-handled tongs and visually inspected. Gating is knocked off with a hammer and the case is placed in a checking fixture before being placed on the conveyor.

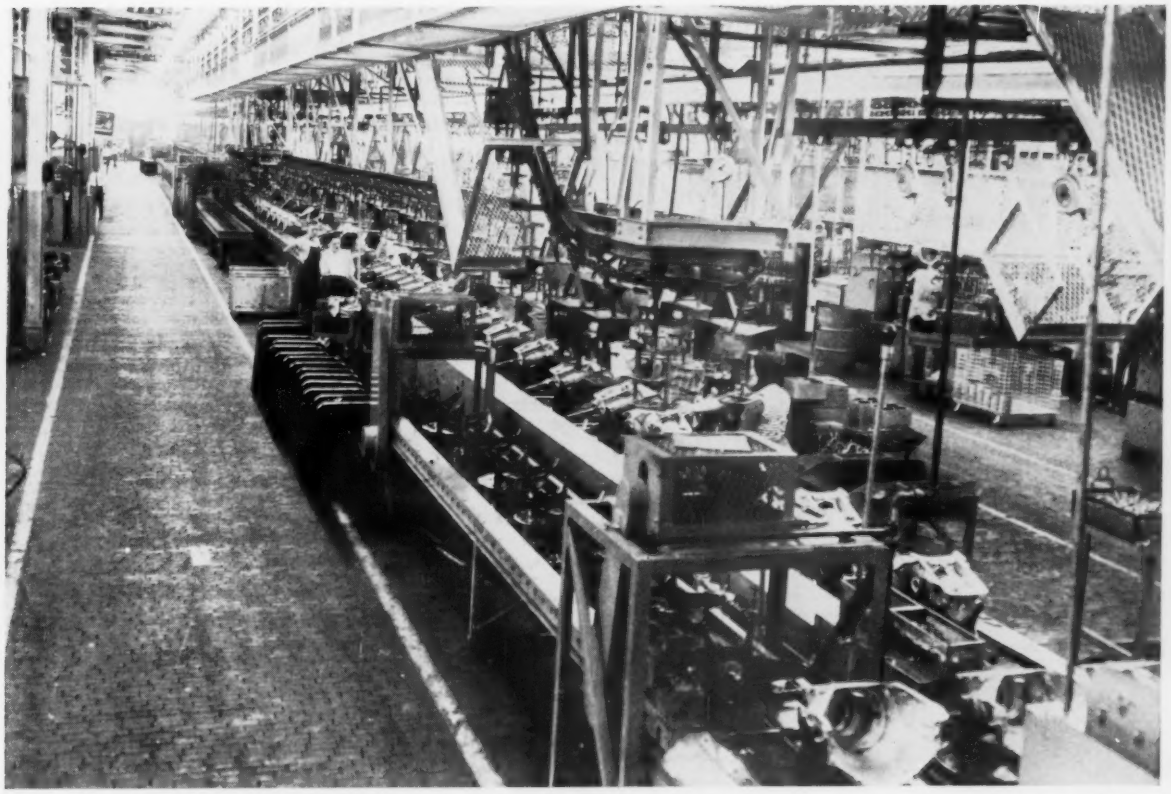
The cases are machined on one of two 37-station, completely automatic transfer machines. A pressure testing unit is incorporated into the machine, and porous castings, if any, are marked with paint so leakers can be identified readily. The cases are washed after machining and conveyorized toward the assembly area.

The diecastings, forgings, stampings, and other manufactured components for the transmission are integrated into subassembly operations and become part of the finished transmission, which is assembled complete and test run before shipment to the regional assembly plants.

A tool and die department does some die fabrication but mainly performs die repair and maintenance duties. A 20-ton overhead crane spans the bay of the diecasting-forging department for movement of dies to the various diecasting machines and to the tool and die department.

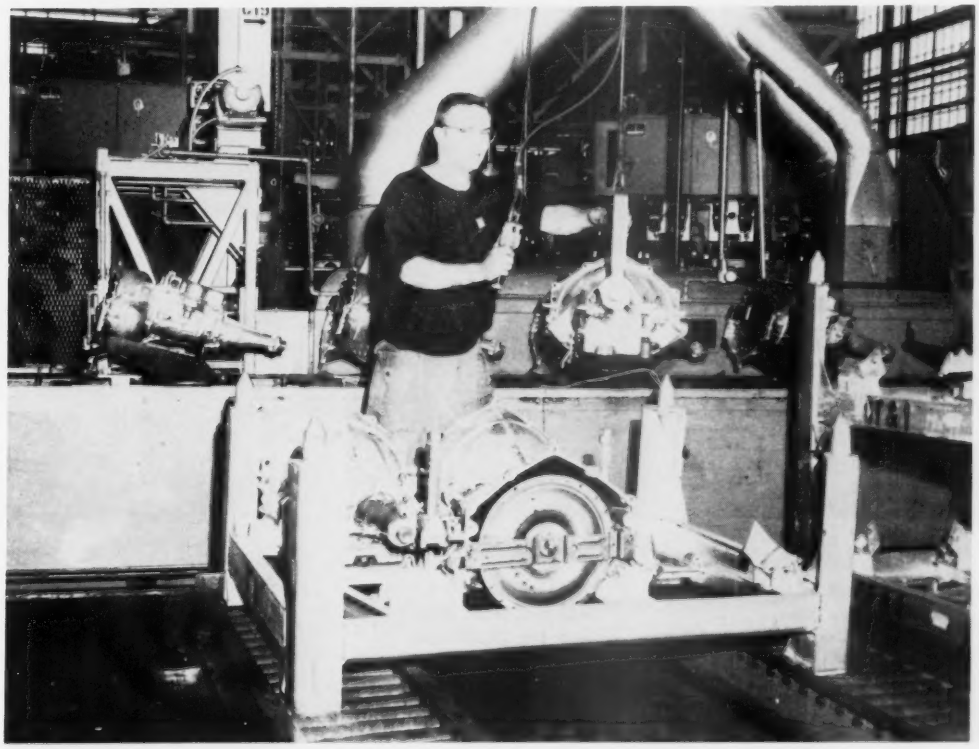
A completely equipped laboratory performs spectrographic, metallographic, and chemical analysis for the diecasting and other plant operations. Speedy metal analysis is supplied so that metal variations can be detected rapidly and adjustments made.

The automotive industry is searching continually for improved, less expensive production methods and materials. Diecasting has proved itself to be a mass production method where long production runs are required and can be maintained. Properly designed diecastings are gaining increased acceptance in applications where the caster can demonstrate, as is being done in this operation, that over-all manufacturing economies are inevitable when efficient, up-to-date equipment is part of a well-engineered production layout.



The numerous subassembled components for the transmission eventually are integrated into a highly mechanized final assembly line

Fully assembled transmissions coming off the assembly line are put on pallets for shipment to Chevrolet's 12 automobile assembly plants



VIBRATION

Can Improve Casting Quality

Recent research has shown what vibrations can do to obtain the full potentials of cast metals in commercial foundries. They can refine grain size and improve mechanical properties

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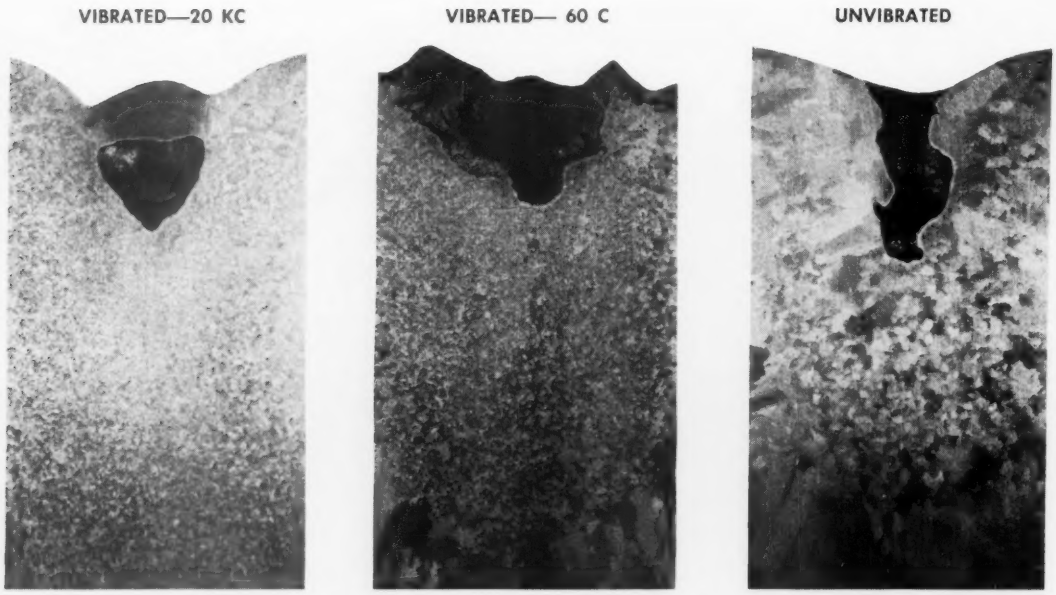


VIBRATED—20 KC
1.0 mm grain diam
Ten str, 26,400 psi
Elongation, 4.4 per cent

VIBRATED—60 C
1.2 mm grain diam
Ten str, 21,500 psi
Elongation, 3.1 per cent

UNVIBRATED
2.4 mm grain diam
Ten str, 19,400 psi
Elongation, 2.9 per cent

Fig. 1—Showing the influence of 60-cycle and 20-kilocycle vibrations on nongrain-refined aluminum-4.5 per cent copper

THE recent general interest in the utilization of applied vibrations in the field of metallurgical processes raises the question of how this tool can be used to assist in the production of castings.

This question is particularly important to those foundries producing high-quality castings to rigid specifications when it is desirable to obtain optimum properties in cast metals and to maintain close dimensional tolerances. This article is concerned with the role of vibrations in obtaining the full potential of cast metals in commercial foundries.

Several investigations that have utilized vibrations applied to molten and solidifying metals have demonstrated the following beneficial effects:

1. Degassing of molten metals.
2. Grain refinement of solidifying metals.
3. Improvement in the detail of castings by an increase in the "apparent fluidity."

These three results of applied vibrations offer promise of improved mechanical properties, uniformity, and dimensional detail of the castings. Each effect will be discussed and the commercial feasibility evaluated.

Degassing Molten Metals—A number of European and American investigators have developed and reported satisfactory procedures for the degassing of molten metals by applied vibrations[1-5]. This work has produced significant degassing by means of magnetostrictive transducers, electrodynamic vibrations produced by superimposing a magnetic field on molten metal in a high-frequency induction furnace, or by vibrating the mold or crucible containing the metal.

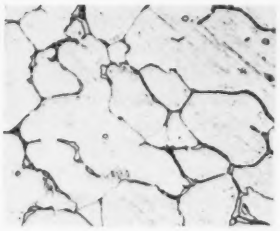
The degassing effect is attributed to the nucleating of small gas bubbles in the melt by the rarefaction wave and subsequent coalescence and escape from the metal surface. The vibration treatments were particularly effective with relatively high contents of dissolved gases. The investigations were conducted primarily with aluminum-base alloys.

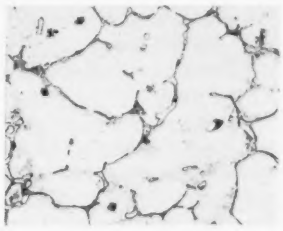
It has been demonstrated, however, that aluminum, copper, and steel alloys can be effectively degassed on a commercial scale by other means. Both chlorine and dry nitrogen are employed to degas aluminum; dry nitrogen and vacuum degassing are effective for copper; steel is degassed within normal commercial ranges by teeming into a ladle under vacuum. Extremely low gas content can be obtained in all metals by vacuum melting techniques. In view of the demonstrated commercial feasibility of these degassing methods, the difficulty and power requirements associated with vibrational degassing, and the limitations on the level of gas content attainable by vibrating, it does not appear feasible to utilize vibrations for this purpose in operating foundries.

Grain Refinement—The improvement in mechanical properties obtained in some cast metals with fine grain size and the undesirable segregation frequently associated with a coarse dendritic structure manifest the advantages of a fine as-cast grain structure. Recent research on the influence of applied vibrations on solidifying metals has demonstrated that the as-cast grain size can be appreciably refined and the mechanical properties improved by both sonic and ultrasonic vibrations[6]. This phenomenon is particularly important to commercial castings that are solidified slowly to yield a large grain size because of the concurrent effect on segregation as well as grain size.

The effect of 60-cycle and 20-kilocycle per second vibration on the structure, grain size, and mechanical properties of aluminum-4.5 per cent copper (commercial 195 alloy) in both the nongrain-refined and grain-refined condition is illustrated in Fig. 1, 2, and 3 respectively[6]. The applied vibrations at both frequencies produced noticeable grain refinement, improved strength, and higher ductility in nongrain-refined 195 alloy.

The macrostructure shown in Fig. 1 indicates the reduction in large columnar and equiaxed grains produced by both types of vibration. The microstructure shows the resulting grain refinement. The strength was increased appreciably and improved ductility accompanied this increased strength. These and subsequent results are the average of several tests and represent a true effect on properties. While the 20 kilocycle vibrations appear to enhance the properties to a greater extent than 60 cycle vibration, this may be the re-



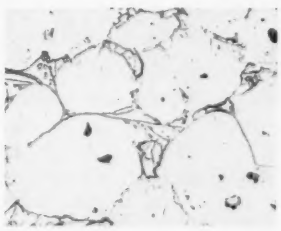


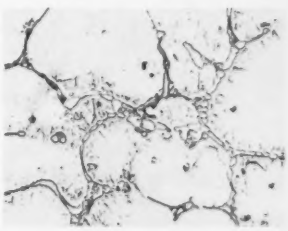
ETCHED MICROSTRUCTURE—100 X

0.83 mm grain diam
Ten str, 36,000 psi
Elongation, 6.3 per cent

0.92 mm grain diam
Ten str, 35,100 psi
Elongation, 5.9 per cent

Fig. 2—Showing the influence of 60-cycle vibration on grain-refined aluminum-4.5 per cent copper





0.14 mm grain diam
Ten str, 26,800 psi
Elongation, 3.1 per cent

0.22 mm grain diam
Ten str, 23,800 psi
Elongation, 2.2 per cent

Fig. 3—Showing the influence of 20-kilocycle vibration on grain-refined aluminum-4.5 per cent copper

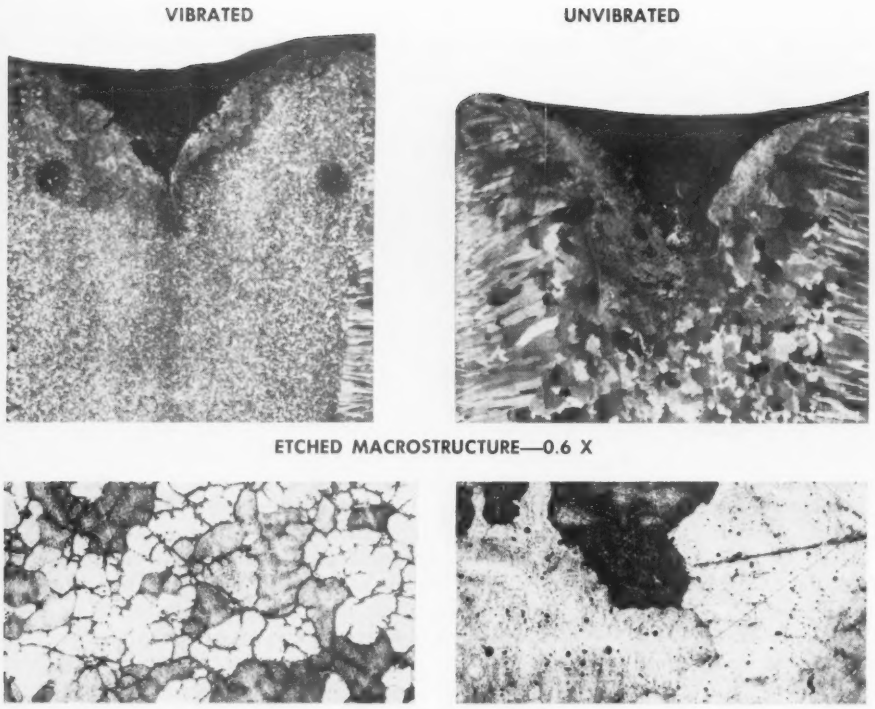


Fig. 4—Influence of 60-cycle vibration on leaded yellow brass

VIBRATED
0.11 mm grain diam
Ten str, 38,800 psi
Elongation, 43 per cent

UNVIBRATED
2.2 mm grain diam
Ten str, 31,100 psi
Elongation, 43 per cent

sult of higher energy intensity rather than an intrinsic result of the higher frequency.

The 195 alloy grain refined with titanium and boron exhibited, as demonstrated in Fig. 2 and 3, only a slight grain refinement and improvement in mechanical properties from both 60 cycle and 20 kilocycle vibration. These results indicate the effectiveness of vibration in some metals but again offer little commercial advantage for this alloy since the refinement can be obtained effectively by simpler and more economical means.

The advantages of grain refinement are of more industrial significance in a cast metal such as leaded yellow brass, which cannot be refined by other methods. The results of 60-cycle vibration applied to a 64 per cent copper, 34 per cent zinc, 2 per cent lead alloy is illustrated in Fig. 4. The macrostructure and microstructure, grain diameters, and mechanical properties contained in this figure clearly show the marked improvement resulting from solidifying under the influence of vibrational energy. The grains have been refined to only 5 per cent of their original statically cast size. This grain refinement is accompanied by an increase in tensile strength from 31,100 psi to 38,800 psi or an improvement of almost 25 per cent as a direct result of vibration of the same heat of solidifying metal. The ductility was not influenced by this increase in strength. These results demonstrate the improvement in properties attainable with such metals.

Applied vibrations are also capable of reducing the segregation obtained in some solidifying metals. This reduction in segregation has been exhibited by a high-alloy tungsten-molybdenum tool steel even when the grain refinement of the metal by vibration has not been marked. The microstructures, contained in Fig. 5, of an unvibrated and vibrated casting of a tool steel section cast in a hot investment mold illustrate the elimination of alloy segregation within the as-cast grains obtained by applied vibrations. Severe alloy segregation in cutting tools is undoubtedly deleterious to metal-cutting properties. This reduction in segregation is observed even though the vibration reduced the grain size only about 16 per cent in this inherently fine-grained, cast metal.

Significant improvements in properties or structure are not always experienced from applied vibrations. Investigations conducted with aluminum-silicon alloys[6, 7], gray cast iron, and aluminum-iron alloy[7] have demonstrated that the as-cast microstructural constituents can be coarsened by vibration. This effect will obviously damage mechanical properties. In addition, the structure and properties of high-strength yellow brass (manganese bronze) are not affected appreciably by vibrational energy applied during solidification[6].

Causes for Variations—The reasons for the different influence of vibration on various metals have been discussed recently [6, 8]. It is the opinion of the authors that the mechanism of solidification of the metal provides the reason for these different effects. The most beneficial results are obtained

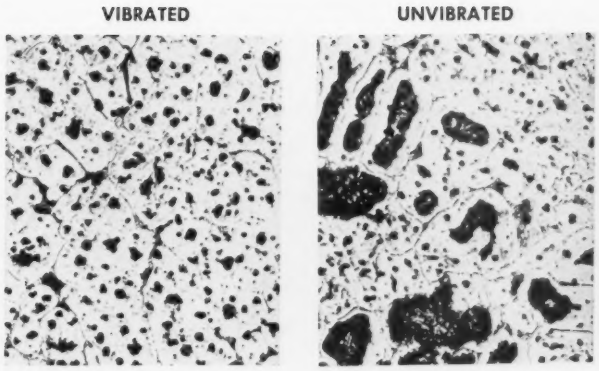


Fig. 5—Influence of 60-cycle vibration on as-cast microstructure of a tungsten-molybdenum tool steel

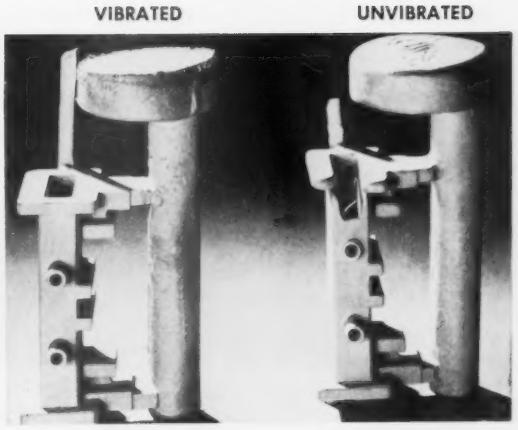


Fig. 6—Influence of 60-cycle vibration on filling and detail of aluminum-4.5 per cent copper casting

from applied vibration when the metal solidifies as a simple solid solution or as a pure metal. If this metal can be refined by small additions or by a special treatment of the melt, such as in most aluminum and magnesium base alloys, then these other treatments are generally of more commercial significance.

If the alloy cannot be so grain refined, however, as exemplified by leaded yellow brass, the use of vibrations during solidification offers considerable advantages. More complex solid solutions such as high-strength yellow brass (manganese bronze) or high-alloy tool steel apparently solidify with an inherently fine-grained structure because of the numerous phases present and are consequently little influenced by the additional grain refining action of vibration. The segregation occurring during the solidification of these metals can be reduced by this vibration as illustrated by the high-alloy tool steel. The structure of metals solidifying as a eutectic, such as aluminum-silicon, aluminum-iron, and gray cast iron are influenced in a different manner by vibrations. The size of the eutectic cells are reduced and this produces a slow solidification rate of the eutectic constituents and resulting coarsening[6]. The result is reduced rather than improved mechanical properties in these eutectic systems.

Practical considerations also dictate that the mold be sufficiently rigid to withstand the vibrational energy. Metal or other permanent molds, core sand, shell and investment molds are satisfactory for either 60 cycle or 20 kilocycle applied vibrations. The high amplitudes associated with low-frequency vibrations, however, would be apt to shatter a conventional green sand mold. The lower amplitudes of ultrasonic frequencies can probably be utilized with the weaker materials such as green sand and plaster without mold damage.

Increase in Apparent Fluidity—While fluidity, as measured by foundrymen, is primarily determined by composition and superheat, the surface tension of the molten metal does exert some influence on the detail or minimum cast section thickness. Aluminum and magnesium alloys form adherent oxide films on the surface which tend to increase surface tension and thus reduce the apparent fluidity. By the application of vibrations to the mold during the pouring of castings from these alloys, the surface tension can be reduced, the fineness of detail improved, and the minimum cast section thickness decreased[9].

The feasibility of employing this increase in apparent fluidity resulting from applied vibrations has been determined for commercial investment castings by the authors. Significant improvement in mold filling and casting detail was obtained on several aluminum investment castings. The photographs of a microwave casting shown in Fig. 6 demonstrate the improved casting dimensions and sharper corners obtained with vibrations. The two castings illustrated in this figure were poured from 195 alloy under otherwise identical conditions.

Although relatively new in foundry operations, the employment of vibrations to improve casting quality, as well as material properties, has been demonstrated both in the laboratory and in a limited manner under actual production conditions. At this stage of development, it is indicated that the employment of vibrations will neither compensate for poor foundry practices nor will the mere presence of vibrations be sufficient to insure the desired improvements; rather, vibrations may be employed as an adjunct to good foundry practices. Further work in this field is anticipated to establish limitations of the tool as well as characteristics of the vibration for key applications.

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The alloy steel foundry of Pacific Alloy Engineering Corp., situated near San Diego, Calif.

Close Control Required To Produce

Aircraft and Missile Castings

Need for stronger and more accurate castings has grown with greater speeds in aircraft and missiles. One West Coast foundry serves this field exclusively, casting with zircon sand shell and ceramic molds

By WILLIAM G. GUDE
Managing Editor

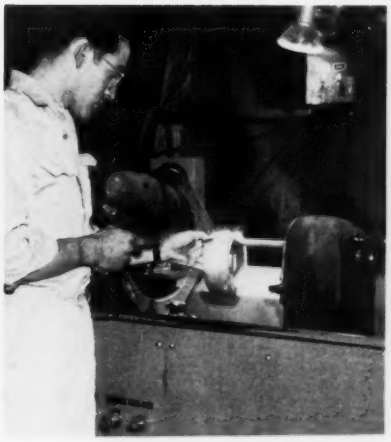
THE average foundry likely would not consider attempting to make the castings being produced by the Pacific Alloy Engineering Corp., El Cajon, Calif. Not that the average foundry could not, with sufficient experience and correct technique, meet the specifications for such castings. But even Pacific Alloy admits that two years ago it would not have tried to cast some of the precision parts it is turning out today.

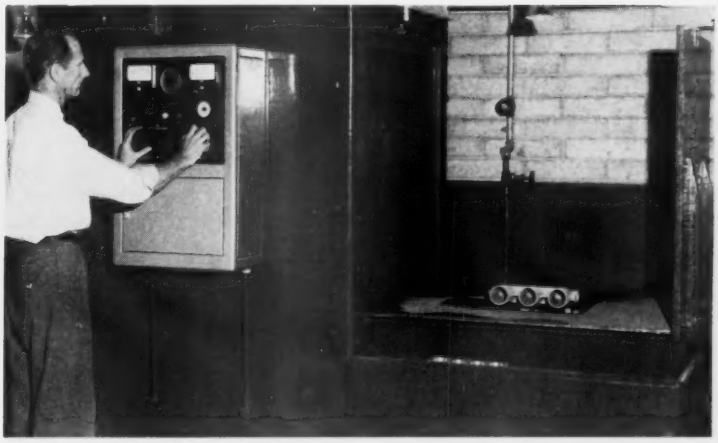
This steel foundry is unique in that it is devoted exclusively to the production of aircraft and missile quality castings. The company was formed about three years ago by its parent organization, Pelton Steel Casting Co., Milwaukee. It bought the stainless steel foundry division of Solar Aircraft Co., San Diego, and operations were moved to a new, modern plant at El Cajon, a few miles east of San Diego. The foundry has 26,000 square feet of floor space and about 40 employees.

When starting production the company had the choice of handling only aircraft and missile quality work or also of making commercial grade castings. It was decided that, in a plant of this size, two sets of standards would be incompatible because, as expressed by Walter H. Dunn, vice president and general manager, "You can't mix aircraft castings with manhole covers."

Market Potentials Growing—The need for stronger and more accurate castings has increased with the development of higher speeds in aircraft and missiles. Military planes designed to operate beyond the speed of sound encounter thermal problems which dictate the use of heat-resistant materials. With the availability of alloy steels of

Stand grinders and hand tools are used in finishing castings. The close tolerances to which parts are cast minimize finishing operations





Aircraft and missile castings require close inspection and testing. All castings receive x-ray examination before being approved for shipment

Pouring floor, with the two induction melting furnaces in left background. Most castings are poured in shell molds, such as those in foreground

high strength-weight ratio, aircraft and missile designers are showing greater interest in adopting cast steel parts—provided they can be assured of obtaining a product of uniformly high quality.

The designer's interest is motivated by another and important factor—the matter of economics. Frequently it has been the practice to make certain parts by hogging them out of solid stock—and the finished article may represent as little as 10 per cent of the weight of the original raw material. The alternative is a casting, and although that casting may cost $25 or more a pound, it will require a minimum of finishing and its final cost may be as little as one-fourth that of producing the part solely by machining.

Castings produced by Pacific Alloy have an average dimensional tolerance of 0.005 in. per in. in sizes up to 6 in. The close reproducibility the foundry is able to attain was demonstrated in one lot of castings which were 38 in. long; the maximum variation in length of the 45 castings produced was less than 0.0015 in.

About three-fourths of the company's castings are made in shell molds. A few parts are cast in baked sand, but ceramic molds are used for most of the other castings. Maximum weight of the shell-mold castings is slightly under 40 lb, the average being about 15 lb. Ceramic-mold castings average about 7 lb. The accompanying illustrations give some indication of the types of parts cast.

Zircon Sand Employed—Shell molds are made of zircon sand averaging 60 grain fineness with 3 per cent resin addition. The high melting point of zircon sand is its principal advantage as a mold material when metal is poured at the high temperature of certain alloy steels—3100-3150° F. This property helps to prevent both loss of detail in the casting and burn-in. Possibly because of the low percentage of resin used, the shells are relatively rigid when warm—a factor in maintaining accuracy of casting dimensions.

In the interest of promoting dimensional accuracy and eliminating casting stresses, the foundry pays close attention to burnout time of the poured mold. Its aim is to have the shell collapse completely by the time the temperature of the solidifying casting has dropped to 2100°. The shell is broken manually if it has not started to disintegrate at 2150°. Burnout time can be adjusted by changing thickness of the mold shell.

Aircraft stainless steel hood flanges being poured in shell molds (Bakelite Co. photo)

Because of the possibility of carbon pickup when certain high-strength alloys are poured in shell molds, ceramic molds are employed for production of a number of the smaller castings. This ceramic material employs a 65-mesh silica sand, a 200-mesh silica flour and an ethyl silicate binder. The molds, made from an accurately formed pattern, are fired at 1600° for eight hours before pouring. Such molds have been used successfully in producing casting sections as thin as 0.060 in. Shell-mold castings are made with section thickness only slightly greater—depending on area involved. Surface finish averages from 80 rms for ceramic-mold castings to 165 for shell-mold parts. Grinding and finished operations required are minimized by the accuracy to which the parts are cast.

Shell mold production involves medium or high production runs. Four dump boxes are used and are able to produce a maximum shell area of 20 x 24 in. A flexible arrangement provided by a master pattern plate permits interchange of individual patterns for partial runs as required. Shell cores also are used extensively. In most instances molds are set out on the floor for pouring either vertically or horizontally depending on type and size of casting. Shell molds generally are clamped together and are supported by sand on the floor for pouring.

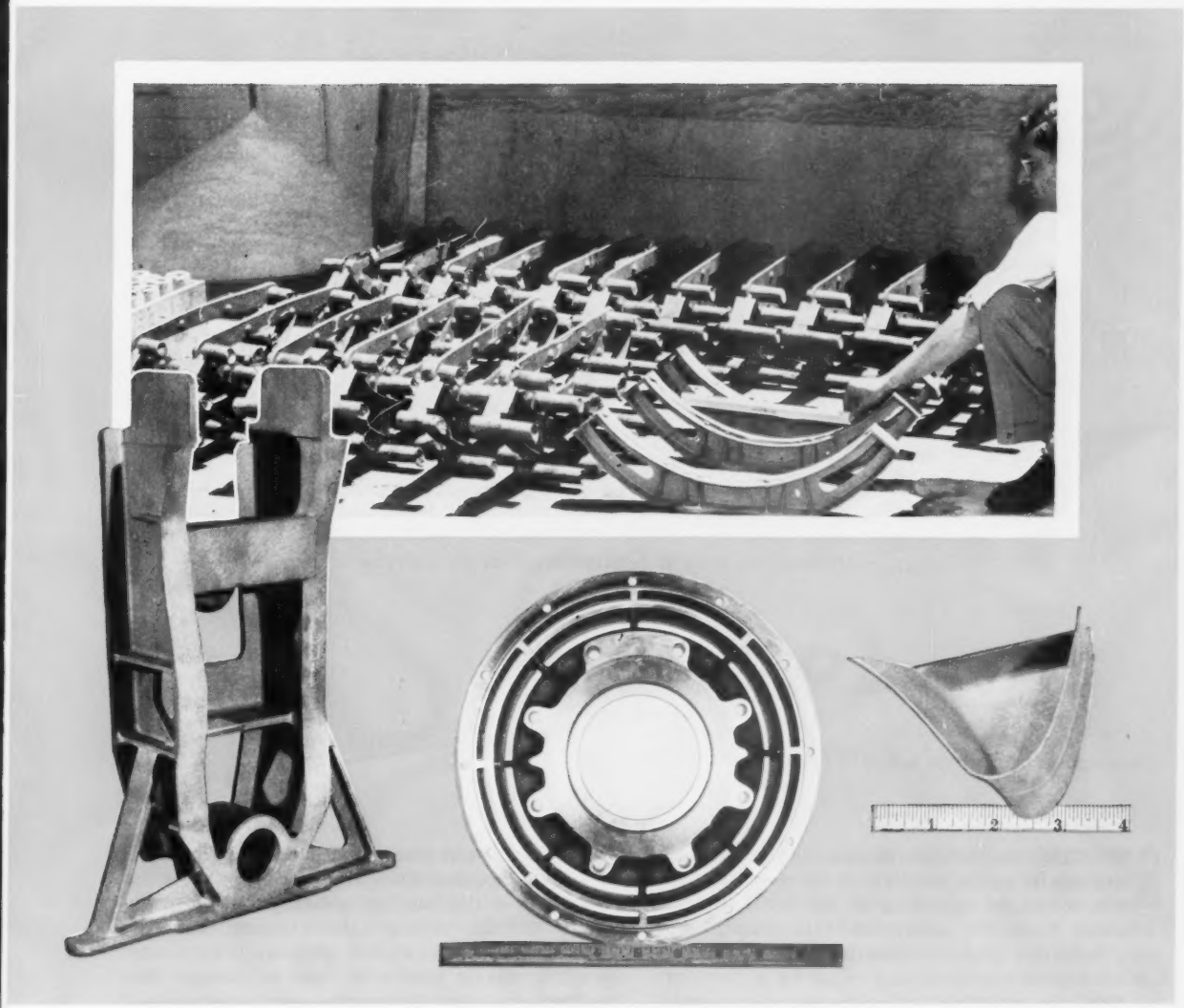
Electric Melting—Hot metal is supplied by two induction furnaces rated at 900 pounds. A shell is available for 300-pound heats, however, when a smaller melt is desired. The furnace charge is Armco iron plus required alloys to give the desired composition.

Alloys produced cover a wide range. They include numerous high-chrome and chrome-nickel analyses, with tensile properties ranging up to 200,000 psi. Gates and risers of some alloys are not remelted because of possibility of gas pickup.

Heat treatment is a critical operation in production of aircraft quality castings because of its possible effect on dimensional tolerances. In some cases it has been found desirable to provide a cast-on fixture for supporting the casting during heat treatment. This part subsequently is cut off. Pacific Alloy has some heat treating facilities for pilot work to determine correct practice, but production operations are performed by outside commercial heat treating shops.

Inspection receives strong emphasis in work of this sort, and the company has complete equipment for nondestructive testing. All castings first receive a dye penetrant test, and 100 per cent x-ray examination also is required before castings are approved and shipped.

Showing the Way—Pacific Alloy and a handful of other foundries producing aircraft and missile quality castings are pioneers in one respect—they are establishing the fact that the casting process



These castings illustrate the type of aircraft and missile parts being produced in a variety of alloys. Maximum weight is close to 40 lb

is suited to the production of parts for the most critical applications.

This type of work requires adoption of a different approach from that frequently used in the past to sell castings. While each part's worth depends on what it would cost to produce by other fabricating methods, the foundry must sell on the basis of quality, letting price fall where it will. Prices obviously must be quoted by the piece, not by the pound.

Problems in selling castings for military aircraft use are numerous but can be overcome. In one respect it is unfortunate that the Air Force is required to take competitive bids; without proper experience the lowest bidder may be unable to fill an order satisfactorily—and the entire foundry industry's reputation suffers.

Too often foundries have discovered that a casting is turned to as a last resort for a particular part, but the design is not suitable for the casting process. The function of a particular part can be filled in many cases by any one of a number of designs. In the event it is not suited to the casting process, it is up to the foundry to obtain an improved design. At the same time it is desirable for the foundry to request design changes when it submits its quotation, not later.

Careful control over each operation—and attested to by an inspector—is mandatory in the production of military aircraft castings. Pieces must be separated according to the heat from which each is produced, and certified copies of metal composition, physical properties and x-ray films of each casting must be supplied.

Aircraft manufacturers will permit certain deviations in chemical properties of a casting if the physicals are satisfactory. They also are more interested in uniformity of dimensions within allowable tolerances than in exceptionally close adherence to exact sizes on only some castings.

SCRAP CONTROL

in Nonferrous Foundries

Control of quality of castings requires full support of management, but offers worthwhile returns in the form of reduced manufacturing costs, greater customer satisfaction, and a higher level of foundry knowhow

By MARTIN G. DIETL*
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REDUCING the nonferrous foundry's scrap percentage is as important and as rewarding as the consistent upholding of the worker's performance level. To accomplish this result, any scrap reduction program must have the full backing of top management and must be a part of the total responsibilities of an inspector or foundry technician.

Scrap reduction actually begins on the drawing board when the casting is first designed. Discussion involving the design engineer and the foremen of the pattern shop, coreroom, and foundry will go far to anticipate and eliminate trouble spots that might appear during production. Good casting design and gating dictate that the poured casting should start to solidify at a point farthest from the gate and freeze progressively toward the gate. Likewise, the grinding room foreman is in a position to reduce production costs through his knowledge of riser and gate cleaning operations. A compromise must be reached between the foundry and the cleaning room as to riser and gate placement, keeping in mind the foundry's first responsibility of producing quality castings.

Check the Pattern—In the case of already established patterns, close scrutiny of the pattern is desirable to check for obvious defects such as missing letters or bosses, the forgotten pattern change from a previous run, and the unrepaired nicks and dents that a pattern invariably collects. A well established program of cleaning patterns, preferably executed when the pattern is returned from a run in the foundry to storage, will prolong pattern life and reduce pattern repair. The immediate benefit from such a program is that only clean patterns in good repair are in storage. The foundry supervisor can rest easier knowing that one source of scrap is under control. Also, a clean pattern gives a better lift and an unbroken mold surface against which the metal can lie, resulting in a smoother casting surface. This has sales appeal.

Together with the pattern cleaning and repair program, which is a pattern shop responsibility, a definite schedule of pattern bushing replacement should be incorporated. The best way to determine the accuracy of pattern bushings is through the application of a go and no-go gage.

Job Records—At this point it might be well to develop a "job history card." Primarily, as the name implies, the 5 x 8-in. card carries all pertinent information such as catalog number, size, and description of the job. The customer's name should appear on the card in case of a jobbing foundry. The cards are best filed either according to size and catalog number, or customer name, or both. Further, the card should carry a brief pattern and corebox description, the metal usually poured into the job, and, most important, a space for the initials of the inspector, or foundry foreman, showing that the new pattern, after the

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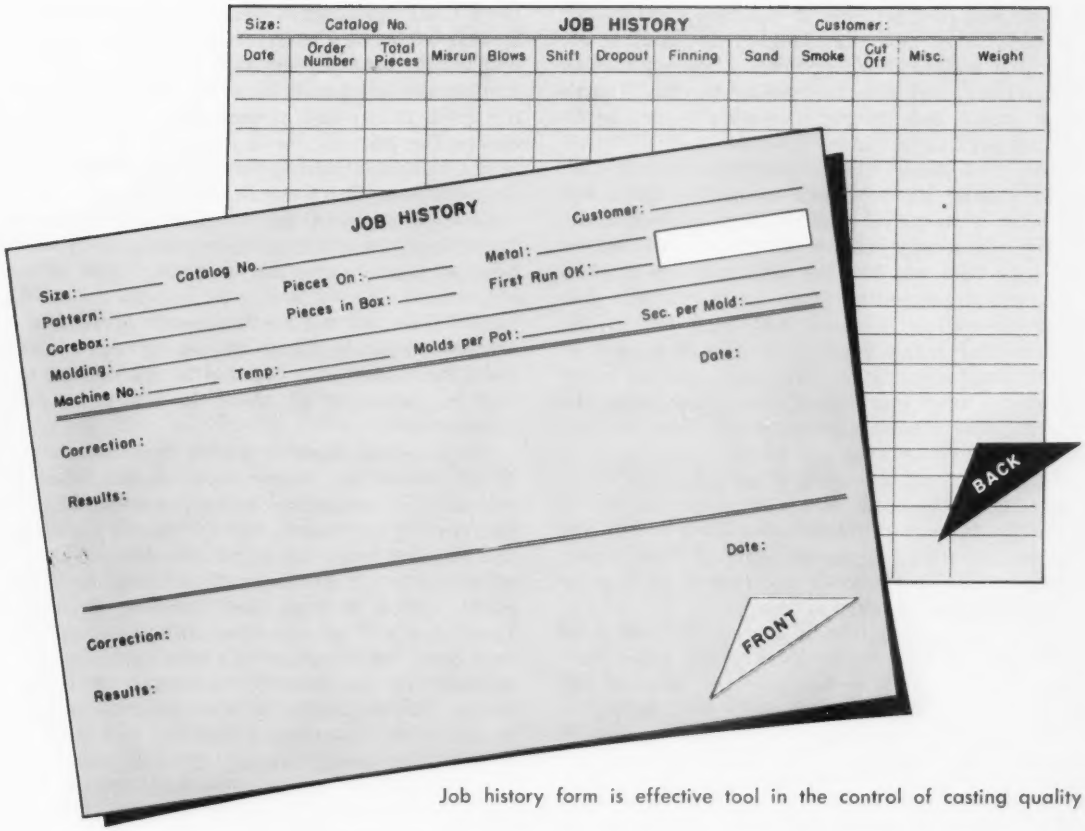


Job history form is effective tool in the control of casting quality

initial run has been made, is acceptable.

No foundry supervisor should accept a pattern with "hidden" defects, perhaps of design or rigging, that will present future foundry problems. For the job history card to be more effective, such special molding techniques as the application of chills, soft ramming, special core formula, molder or machine identification, and number of jolts per mold should be noted. Other important information such as pouring temperature, number of molds poured, and pouring time per mold should be entered.

All this detailed information may seem quite involved. Its purpose, however, is to tie down some of the more common variables and reduce the good guess or memory of the foundry supervisor to a more scientific approach through the application of the best proven method in a repetitive process. The remainder of the card is divided into columns labeled with the common foundry defects. The cumulative scrap from each run of the pattern in the foundry is dated and entered on the job history card not only as a permanent record, but also as a basis for comparison of improvements. In addition, some foundries make extended use of photography in recording the rigging of a pattern and the making of the mold.

Sand and Metal—Together with the job history card, other reference files will help the foundry operate at a lower scrap level. The daily sand check report, both core and molding sands, serve in an excellent manner to keep the foundry in its optimum sand operating range. Naturally, any deviation from the accepted sand properties should be investigated and corrected. Records of core and mold sand formulations should be on file in the front office as well as near the sand mixing stations.

Similarly, the constituents of the metal charge, the furnace in which the metal was melted, and a record of melt time and power consumption are information which can be entered on a "charge ticket" and will be helpful in determining the reasons for an off-color heat. Furthermore, such charge tickets, being a measure and record of the amount of work performed in the melt room, can serve as a basis for a wage incentive program.

One system of data that must not be overlooked is the molding operation sheets developed by the standards department. It is advisable to hang such operation sheets near the molder so that he can reacquaint himself with the accepted molding technique. The molder will not only produce molds of more consistent properties but also raise his level of performance.

When a new order has been sent to the foundry, supervision has the responsibility of assuring that the right pattern with its correct corebox is released to the shop. No scrap is more ridiculous nor easier to eliminate than that generated through the use of wrong pattern equipment. The use of wrong equipment can be prevented by following

Invariably, the first objection to such a system shrinkage. Even if the foundry were working at

a rigid rule of inspection of the first mold by the foreman. This mold checking gives foundry supervision an excellent opportunity for last-minute instructions, and also for testing for mold hardness, proper core setting, and such special applications as chills and nails.

The First Mold—At this point, dusting the open mold, closing the mold and opening it again will serve as a means of locating mold crushes, badly fitting cores, and possible mold flashes wherever the cope does not kiss the drag properly. Such a program of preventing scrap applies to new patterns as well as to jobs that have run in the foundry for many years. Nor does this type of preventing scrap apply to mold making only; through proper marking of the closed mold, the pouring and laboring crews should have the responsibility of pouring and shaking out the first mold of any job as soon as possible. Immediate cleaning of the gate of castings and inspection with fractures by the foreman will reveal any rigging, pouring, or temperature defects before too many molds are made and poured off. Corrective actions can be taken at once.

As a regular routine, a system of production inspection should be initiated whereby gated castings are sampled after being poured, cleaned, and inspected by supervision. Defects such as shifts, sand washes, crushes, misruns and improper molding and pouring practices are readily detected. Here again an opportunity presents itself for foreman-molder consultation and possible correction. This type of scrap detection system can be motivated by a retired molder, or it can be incorporated into the regular duties of the labor crew.

In spite of all precautions, a foundry will generate scrap. Expending all effort to keep this scrap to a minimum, a postmortem examination of these defects, through an organized analysis, will lead to a solution of the scrap problem. To this end, some delegated person not directly connected with the foundry production personnel, such as an inspector or foundry technician, is charged with the responsibility of segregating, classifying, and recording the scrap as it comes to light in the cleaning room at the end of each shift. An immediate conference, best set for a definite time each day, of the foreman, molder, and floor inspector should be called to develop corrective measures.

Scrap Reports—A daily scrap report listing all items, broken down into the individual scrap classification, must be compiled and distributed to each department. Here again is an opportunity to call attention to the main offenders of scrap and to provide a running record of casting improvement. Each foreman is in a position to analyze and correct his contributory share to the total scrap situation.

Any amount of scrap greater than an arbitrarily set percentage figure must be scheduled for discussion at a regularly held scrap meeting involving the superintendent, all the foundry foremen, and foundry technicians. At this meeting all possible evidence in the form of patterns, coreboxes, cores, gated castings, and foundry production knowledge will be presented and examined. Not only must the suggested remedies for each job be recorded by the foundry technician or assigned person, but responsibility also must be delegated to carry out the recommendations and to report back to the scrap meeting at some future date the findings of such investigations. A record of these findings must be kept on the job history card to avoid work duplication.

It becomes obvious that this seemingly elaborate scrap reduction procedure has its success founded on: 1. An accurate, up-to-date job history file for each pattern. 2. Some person charged with keeping the histories current. 3. A sparkplug to do something about the scrap. 4. Constant use of the job history file as a basis from which to run the foundry with the lowest scrap loss.

DAILY SCRAP CASTING REPORT

Pounds Shipped

Name Catalog No.	Number Pieces	Misrun	Blows	Smoke	Cutoff	Dropout	Core Crush	Finning	

Daily scrap report calls attention to main offenders and enables each foreman to analyze and eliminate his responsibility for the occurrence of scrap

Invariably, the first objection to such a system of scrap reduction is the cost of maintaining it. Depending on the size of the enterprise, the duties of scrap reduction procedures may be incorporated into the responsibilities of an existing job or a new position may be created. The mere fact that allowances for scrap castings are made in the pricing formula, which the customer will pay, does not lessen the need for reducing the scrap. After all, if the customer can buy cheaper, or the foundry can bid lower, more business will be generated.

Figuring Scrap Costs—For the sake of this discussion, the following illustration will be based on average, over-all figures in determining the cost of replacement of defective castings. Let us assume:

1. That the "A" Foundry Co. operates at a scrap level of 10 per cent.
2. That the average loaded labor hour costs $5 for each department.
3. That the melt room delivers metal to the sprue for $0.01 per pound.
4. That the foundry melts a total of 40,000 pounds of brass per day yielding about 20,000 pounds of castings.
5. Eighteen direct labor hours per hour (ten molders, two coremakers, six men in the cleaning room) are needed to produce this tonnage.

Total direct labor and overhead equals: $5 × 18 × 8 or $720 per day. Losses entailed due to making scrap are these:

1. Metal shrinkage of 6 per cent of the original brass heat of 40,000 pounds.
2. Metal shrinkage of 6 per cent of the second melting to make up the scrap.
3. Cost of melting the metal a second time.
4. Ten per cent loss of the loaded labor hour per department. This is another money loss that is actually thrown away by making scrap.

Of the above four losses, this paper does not concern itself with the loss of the first metal shrinkage. Even if the foundry were working at a 0 per cent scrap loss, this metal shrinkage would still exist to a greater or lesser degree. Going back to the assumed daily production of 20,000 pounds of castings, a 10 per cent loss due to scrap equals 2000 pounds. To replace these castings, 4000 pounds of metal will have to be melted which will incur further melting costs and metal shrinkage losses. In summarizing these losses, the following figures emerge to replace 10 per cent or 2000 pounds of scrap castings:

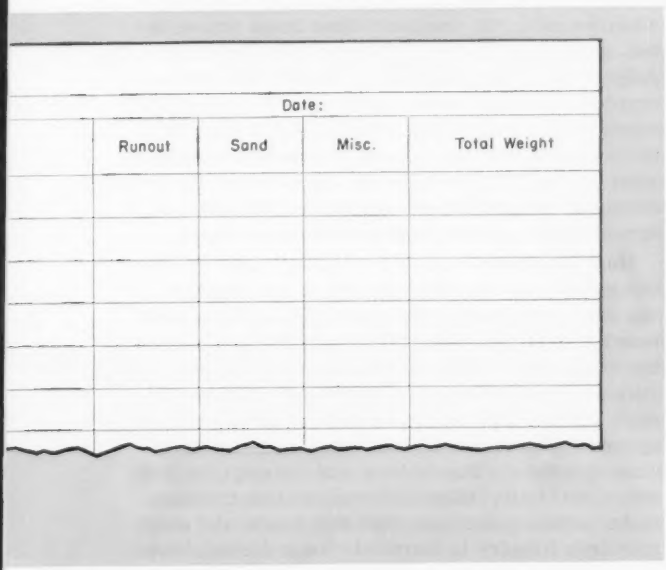
Melting 4000 pounds of metal at $0.01 per pound	$40.00
Metal shrinkage of 6 per cent of 4000 pounds at $0.35 per pound	84.00
Ten per cent of original direct labor and overhead	72.00
Loss per day	$196.00

A saving of 1 per cent in scrap would mean a saving of $19.60 per day, or a return of $4900 in one year (250 days). The foregoing figures are for the purpose of illustration only and are not to be confused with the actual operation of any foundry. To determine the actual cost savings effected by a 1 per cent reduction in scrap, more accurate operational data must be applied. Also, the use of average numbers is dangerous because some jobs, due to their more intricate nature, will just run higher in scrap; also, the same weight castings may have different gating systems and, consequently, different cleaning costs. Furthermore, a nonferrous foundry casting both aluminum and brass must differentiate between the two metals because of the difference in their respective weights.

More than Records—In summarizing, the mere existence of records will not reduce the foundry scrap percentage. Such a system needs the full support of top management. Usually, the reduction in manufacturing costs through a lowering of the scrap will justify the cost of a responsible person to sparkplug the program of implementing and maintaining a system of records. This person can help the program further by plotting curves of scrap vs sand properties, for example, or by depicting graphically the amount of scrap produced per molder, or per department, and so increase employee morale through team spirit. The intangible benefits derived from such a program are greater customer satisfaction and the development of job histories resulting in a level of knowhow that becomes independent of the operating personnel.

The author is indebted for a great deal of the above information to the *Transactions* of the American Foundrymen's Society, and to the basic cost principles of the Non-Ferrous Founders' Society.

This paper was presented originally at the 1957 California Regional Foundry Conference.



Why You Need a

Cost accounting is one of the most vital factors in the success of any business. Prices must be based on facts. This article is the first of several on cost accounting programs in gray iron foundries

THIS article is first of a series of several which will deal with the following phases of cost accounting in a small gray iron foundry:

1. Sensible accounting fundamentals or principles.
2. A simple and comprehensive method of establishing operating standards to be employed in preparing selling policies (when to accept or reject business).
3. Procedures for accumulating, calculating, and recording cost information for each job.
4. Reports to management that are comprehensive, timely, and easy to understand.

Mystery and ignorance go hand in hand, but nothing is mysterious to those who know the truth. The day of haphazard and makeshift cost methods has passed. The gray iron foundryman who wishes to stay in business always must base his prices on facts; otherwise he is not deserving of the confidence of his customers. Cost accounting thus is one of the most vital factors in the success of any business. It must be carried on in a small gray iron foundry just as diligently as it is carried on in the plant of a large, successful competitor.

What Is Cost Accounting?—Effective cost accounting is governed by fundamental principles just as definite and understandable as the principles of mathematics or physics. It is the science of analyzing the expenses of production and the charging of these specific expense factors to process unit rates in the exact ratio of their utilization.

The following outline lists some of the most vital factors fundamental to effective cost accounting: 1. Guidance in controlling production operations. 2. Compiling of operating and financial statements reflecting actual performance. 3. Determination of cost of individual castings produced. 4. Determination of the relative profit realized on the various shapes and sizes of castings produced. 5. Preparation of analytical, comparative statements showing the cost of each lot so that unprofitable jobs may be isolated and studied with the view to changing methods of production, specifications, or prices.

Attitudes Differ—Since cost accounting is an essential subject, public accountants, industrial engineers, professors, cost clerks, and cost committees long have wrestled with it. The results of their several efforts are almost as divergent as their individual conceptions of the subject itself.

It is obvious that "You must learn to walk before you can run," but we must not use any unsound principles and procedures just because of their simplicity of operation rather than their effectiveness. The sensible thing to do is to learn to walk correctly. Thus when one accepts recommendations for the adoption of cost accounting principles, he should be certain that they are sound.

Establishing Procedures—Procedures sometimes are established which are adequate for the needs of the business, but in practice never are carried out or gradually break down over a period of time. It therefore, is important that new procedures consistently be followed up and tested before they are abandoned.

Executives of a small gray iron foundry who are entrusted with the management of its affairs must protect the interest of its owners—whether they be stockholders, partners, or just individuals—by seeing that a dependable cost system is established. This move can be carried out most effectively if every operation is analyzed and sensibly allocated to individual castings. Cost accounting for price making is an important task, and the man who sets prices for castings jobs in a small gray iron foundry holds the key to profitable operations.

Abraham Lincoln once expressed this thought when he said, "If we could first know where we are, and whither we are tending, we could better judge what to do and how to do it." The cost accountant should be able to present data to indicate where we are and whither we are tending, but it is the man who sets the prices who must determine what to do and how to do it. How successful his decisions are depends on his perception and courage—courage to face facts and act accordingly.

More Progress Needed—A thorough inquiry into the methods of cost finding now in use throughout the gray iron foundry industry reveals that progress has been made in cost accounting procedures, but that widely different methods of applying the various cost elements to individual castings still exist. These differences in method often produce apparent differences of cost when actually no difference exists. The author will attempt in this series to clarify these differences and to recommend certain procedures that will enable the small gray iron foundry to formulate bases for establish-

Cost System

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ing sales policies that will control the various activities of the business. The cost principles set forth are not particularly complex. They are logical and practical, although they may not correspond with some others.

Much emphasis should be placed not only on sound principles and practices in cost accounting itself, but, equally important, on the presentation of the results to the operating and corporate management so that they may use them to determine sales policies and measure operating efficiencies and deficiencies. The cost accountant thus becomes a true executive or at least an important adjunct to the executive group.

The user of a cost system must not permit himself to be influenced by a desire to have the results conform to his own impression of what it should be. Too many accountants, because of the latitude permitted in cost accounting practice, think that they are competent to pass judgment as to where certain expenses should be applied. A desire to please the boss by making unprofitable items appear profitable adds to the temptation. Even the boss himself sometimes yields to the temptation to hide some inefficiencies that may influence the results. Thus the foundryman may give away his product, either purposely or ignorantly.

Size of Company—We hear a lot about one kind of a cost system for the large gray iron foundry and a simpler system for the small gray iron foundry. Since each foundry must melt iron, make cores for some jobs, set up molds, and clean castings, the fundamentals of sensible cost finding necessarily must be the same, particularly if the small foundry produces the same type of castings as its larger competitor. The difference lies not in its size, but in the number of cost calculations required.

There are both large and small gray iron foundries, as measured by tonnage output, which produce long runs of the same pattern. These foundries usually are considered production foundries. These long runs may be the prevailing tonnage in either the large or small foundry, but some of the so-called production shops have considerable tonnage in miscellaneous jobbing work. Another important consideration is the fact that the production jobs may be all light work, all heavy work, or part light and part heavy.

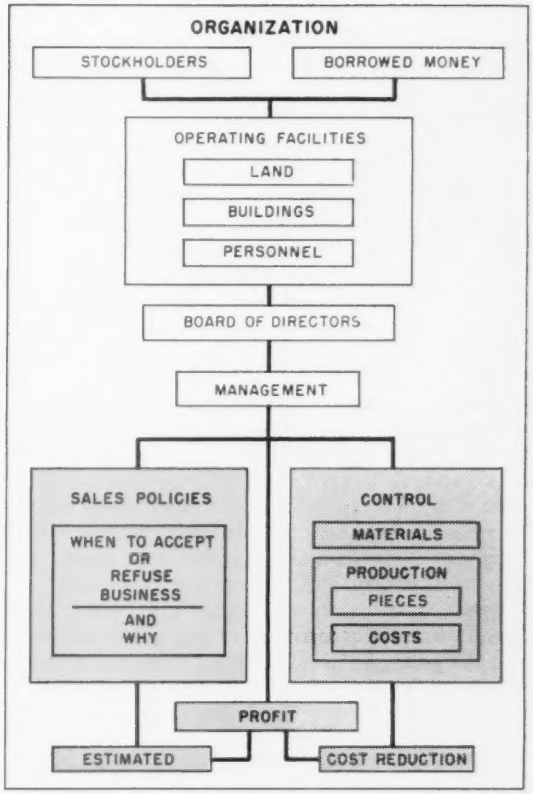


Diagram shows importance of two major management problems: 1. Establishment of sales policies. 2. The control of materials and production

Since it is not size of the foundry that makes different procedures necessary, but, rather, type of castings made and different ways of performing operations, it is almost impossible to set a positive line of demarcation between the large and the small foundry. Some small foundries, like many of their larger competitors, have provided splendid buildings and equipment and rosy prospects for success, but no means of measuring operations in terms of profit. It is self-evident that profit is the margin between cost and selling price, yet this basic fact frequently is overlooked when selling prices are cut to meet the price set by a competitor or to keep the foundry busy.

Weed Out Undesirables—Due to the multiplicity of kinds and sizes of castings produced and sold by an individual foundry, it is necessary to know definitely what castings can or cannot be made in the company's own foundry and sold at a reasonable profit. A knowledge of this kind enables the company to weed out undesirable kinds and sizes such as those underpriced by competition or those the company is not equipped to produce efficiently.

Some foundryman will say, "my foundry is different. I do no outside jobbing work—only castings for my fabricating shop." The fact that the castings are used in the company's own departments in

fabrication does not alter the foundry operations necessary to produce the rough castings. Therefore the system of costing should be as accurate and dependable as if the castings were sold to some other company for fabrication.

Profit Is Important—No matter how busy the foundry executive is with the production of castings, he should devote a considerable portion of his time to a consideration of company profits. He should determine the source of these profits as well as their size in order to shape intelligently the best policies for his particular foundry. To do this, he must satisfy himself that the costs and other statistical information furnished him are fundamentally sound.

Since a foundry executive, whether connected with a large or a small organization, is a busy man, he should have facts related to costs served to him in a nutshell. Therefore it is important to determine what reports are required; what items should be embodied in the reports; to whom reports should be given; how often reports should be given; and how management should treat the reports.

Two major types of reports are those which show the status of the business at any particular time and the gains or losses resulting from operation of the foundry. An effective balance sheet shows, in one complete picture, the financial state of affairs in the business. Gains or losses as a result of operating the foundry should be incorporated in statements showing the following: 1. Income from sales of castings. 2. Operating costs required to produce and market those sales. 3. Gains or losses, by individual jobs, with reasons therefore.

Something about cold print and figures makes some foundry executives shy away from them. Sometimes these reports seem difficult and uninteresting, to lack human interest. Reports to executives therefore must be thoroughly comprehensive, accurate, timely, and simple to understand.

Measuring Costs—Since the function of foundry manufacture is to convert metals into forms suitable for the customer's use, it is necessary to measure the costs of the operations required. These operations include melting iron, core making, molding, barrel cleaning, and hand cleaning.

Executives of every foundry recognize that consideration must be given separately to the three major elements of cost—metals, labor, and burden (or overhead). The last presents the greatest problem.

Since there is much difference in the character of production operations, product, and the methods used to allocate elements of overhead to items of product, it is necessary to consider five important fundamentals of effective analysis and distribution —land, buildings, equipment, employee expenses, and general expenses. In some manner, these expenses must be included in the cost of each item of product.

Since dependable overhead or burden costs can never be obtained by averaging unrelated cost elements, individual allocations should be made on the following bases: 1. Direct charges to departments and/or cost centers. 2. Area. 3. Equipment values. 4. Employee hours. 5. Employee earnings.

Expense Elements Definite—Every expense element is definite. It is definite in amount, or it could not be recorded. It is definite in purpose, or it would not be authorized. Its purpose always is the procurement of a definite service or commodity more advantageous than the amount of money involved; otherwise the exchange would not be made. The advantage gained by the expenditure imparts a definite degree of benefit wherever the purchased item is utilized.

Correct distribution of an expense item demands that the charge always be made against the product benefited, and if more than one item or process is benefited, the charges must be made in proportion.

Types of Expenses—Expenses always have one of two qualities: They are either direct or indirect. Direct expenses are items with a single beneficiary, to which they are chargeable. No act of distribution is required. Indirect expenses are items with two or more beneficiaries to which they must be charged in proportion to the benefit conferred.

Indirect expenses may be grouped for simultaneous distribution only when the beneficiaries are identical, the ratio of benefit is the same, and the benefits are measurable by a common unit. Ignorance of this principle has been one of the most serious obstacles in the paths of some individuals who have tried to solve the problem of overhead distribution. When this principle is violated, primarily as a means of economy in effort, effective distribution becomes impossible.

Almost no operating expense (overhead) has any relation to or is involved in the ratio of wages paid to workmen. Practically every expense involved in the operation of foundry processes has a definite relation to the element of time.

Rent is paid on a time basis, or if the building is owned, items of depreciation and insurance on the building and interest and taxes on the investment in building and land are calculated on a time basis.

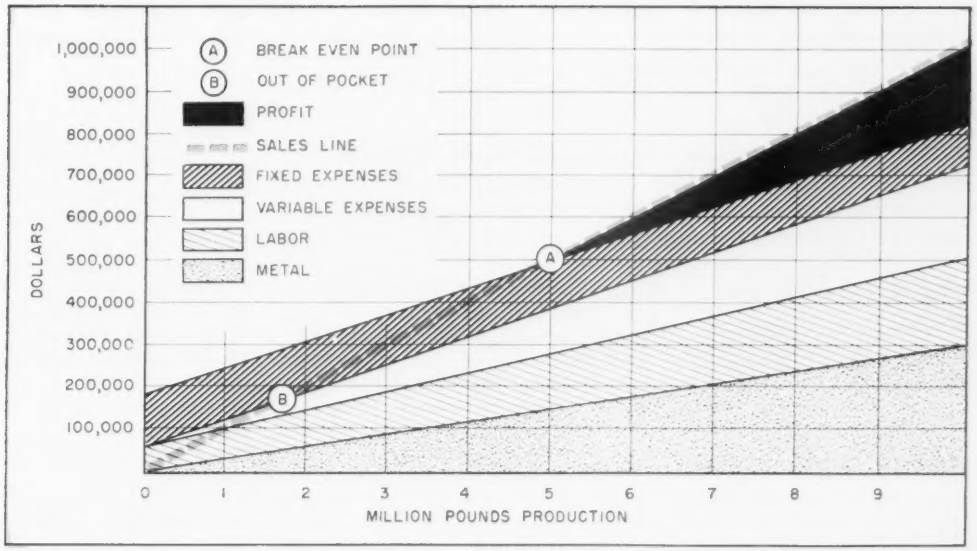
Expenses incident to equipment investment, such as depreciation, insurance, interest, and taxes, all are related to time. The amount of investment and the elements of time are important factors.

The expenses of the power plant, or for purchased electrical energy, are related to time. Horsepower required to operate the processing facilities and the time of operation provide the means of determining the proportions of power expense chargeable to the several producing facilities.

The superintendent and foremen supervise the active time of the individual employees and therefore are not universally related to the hourly wages of employees employed in different foundry activities.

Supplies consumed in the operation of the processes are required practically in proportion to the active operating time.

Fair Profit—It is not enough to run a foundry efficiently, for if a foundry is not conversant with its costs as they should be, which are standard costs, it can help to demoralize a group market



WHEN TO ACCEPT ORDERS

It must be sales policy to solicit business and accept orders only for castings which the foundry is equipped to produce efficiently and which will return a profit on invested capital or, in periods of low production, recover wholly or in part the fixed cost of operation. Frequent changes in volume requirements caused by business conditions make it advisable to base sales policies on costs calculated on normal operation.

Fig. 2 above illustrates a method of arriving at the break-even and out-of-pocket points. Elements of cost are segregated as to variable and fixed types. Variable elements are those which fluctuate to a large extent with volume produced, whereas fixed elements are not influenced greatly by production volume.

It is assumed that normal output is 10 million lb at a market price of 10 cents a pound. Should the company fail to secure this normal output, with market price and fixed costs remaining constant, profit would decrease as shown. The break-even point, approximately 5 million lb, is where the company recovers its operating expenses.

When we project the sales line to the point of no production, it bisects variable costs at 1.6 million lb, the out-of-pocket point, where bidding must stop. Otherwise the company will lose costs of expenditures caused by acceptance of the business. The fact must be accepted that no legal restrictions are placed on companies which bid for business below their break-even points.

and make it impossible for either themselves or their competitors to earn a fair profit. Under our economic system, the more competitive we are, the more the necessity for each foundry to be sure that its costing methods are sound in principle and effective in operation.

Competing companies are going out after the consumer's dollar with unprecedented vigor. The companies that will get the cream of the business will be the ones that know definitely when to accept or reject business—and why (see Fig. 1), regardless of the prices set by the competition. Prices established by competition might be predicated on costs that are faulty or on willful price cutting.

A foundry cannot continue in business indefinitely without profit. Profit can be realized only when there is good merchandising. Good merchandising, in turn, must be predicated on a knowledge of the potential market, intelligent and accurate cost information, and a goodly amount of fortitude in the establishment of sales policies.

Problems of Management — Management problems in a small gray iron foundry, as in a larger plant, are divided into two major classes: First, the establishment of sales policies. Second, the control of materials and production (Fig. 1).

Like every manufacturing company, the small gray iron foundry must have operating facilities including land, buildings, equipment, and personnel, furnished variously by stockholders, partners, individual owners, or borrowed money.

In a corporation, conduct of the business is vested usually in a board of directors, which selects one or more of its members or some other individuals to manage the business. Let us consider them to be top management. Certain individuals of top management may devote their activities either wholly or in part to the control of producing and marketing castings.

In this illustration, Fig. 1, the colored sections represent the relationship of sales policies to estimated profit. The term "sales policies" is used in place of sales price because often the company must meet an established price. Therefore a pricing policy must be determined to decide whether to accept or refuse the business.

The "Control" section deals with the actual cost of the job to ascertain whether there is a reduction or increase in cost which may be compared to the estimated cost and profit—a matter of tremendous importance to management. Intelligent attention to these controls has a decided effect on the profit situation of the foundry. To accomplish this goal, it is necessary that certain basic cost principles be adhered to. These principles will be stated and explained in subsequent articles.

Questions and Answers

Poor pouring practice probably causes cold shuts in brass casting . . . Thermal shock results in heat checks in mold for glass making . . . Plaster molding . . . Methods for producing lead oxide . . . Cupola melts slowly

Iron Not All in Solution

QUESTION We are sending for your examination a sample of manganese bronze from one of our recent melts which shows white magnetic segregation. We have observed the same thing in three other castings. While this does not appear to affect the tensile and yield strengths, which are always over the 90,000 and 45,000 psi values, respectively, required, the elongation—which should be 20 per cent—drops as low as 8 per cent. The bronze is melted in silicon carbide crucibles.

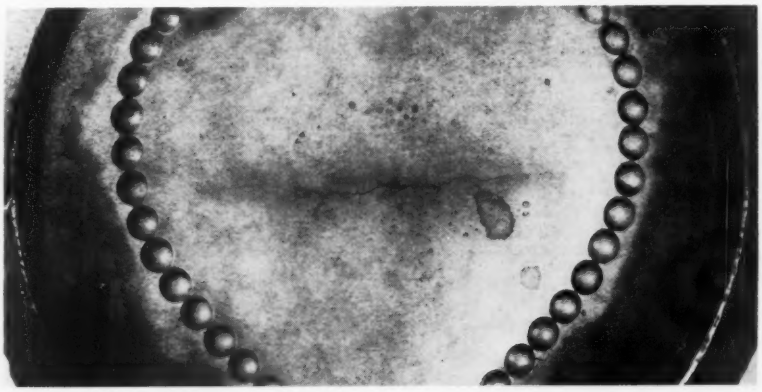
ANSWER Examination of the specimen shows that the presence of a thin sliver of steel, and presumably that is what you refer to as the white magnetic segregation. You do not mention whether you are making the manganese bronze by using copper, zinc, steel clippings, etc., or purchased ingot. If you are making your own alloy, you are not getting all the iron into solution. If you are using purchased ingot, then the ingot maker is having the same trouble.

Possibly the ferrous material may come from scaly iron or steel rods used for stirring, but that hardly seems likely since you mention the same difficulty with several heats.

Glass Mold Shows Heat Checks

QUESTION We are enclosing a photograph of a glass die or mold which suffered damage during service, and we will appreciate information on the fundamental cause as well as suggestions on correction. This trouble appears often in a similar manner in other molds. Iron used for the mold contains 3.28 to 3.30 per cent TC, 2.20 to 2.25 per cent Si, 0.65 to 0.70 per cent Mn, 0.35 per cent P, and 0.09 to 0.11 per cent S. It does not contain Ni or Cr. Pouring temperature is approximately 2400° F. Molds are annealed at 1500° F for a period of 2½ hours, and cooled in the furnace for 12 hours. Temperature of 1500° F is reached in about 5 hours. Glass temperature is 2000° F.

ANSWER The defect or crack shown in the glass mold is a heat check or fire crack. It is caused by the thermal shocks generated by the alternate heating and cooling of the mold in making glassware. According to an investigation by Bruckner and Czyzewski, available in the AFS *Transactions*, 1942, difficulty from heat checking can be minimized by use of an alloy iron annealed to develop a structure with a matrix of free ferrite, partially spheroidized pearlite, and lamellar pearlite. The authors stated that with this type of structure, the ferrite absorbs the thermal shock and the lamellar pearlite provides strength to resist the spread of cracks.



Crack in central portion of mold is termed heat check or fire crack and results from thermal shock developed through alternate heating and cooling during use

In the investigation, the alloy iron which gave the best results contained 2.40 per cent Si, 3.44 per cent TC, 0.66 per cent Mn, 1.25 per cent Ni, 0.45 per cent Cr, and 0.50 per cent Mo. Specimens were annealed by heating slowly to 1450° F, held for 4 hours, and furnace cooled. The authors found that while sand-cast blocks (6 x 9 x 2½ in.) gave better results than chill-cast specimens (6 x 9 in. face against the chill), the coarse graphite flakes resulted in an open, porous structure which could not be polished satisfactorily for glassware production.

Other alloy iron compositions noted in the literature include one containing 2.15 per cent Si, 3.65 per cent TC, 0.30 per cent P, 0.70 per cent Mn, 0.50 per cent Mo, and 0.50 per cent Ni; 2.15 per cent Si, 3.44 per cent TC, 0.65 per cent Mn, 0.35 per cent P, and 0.60 per cent Mo; 2.43 per cent Si, 3.30 per cent TC, 0.41 per cent Mn, 0.28 per cent Cr, and 0.43 per cent Mo.

Possibly you may have reasons for not wanting to use alloys in the iron, and in that case we suggest you try inoculation of the metal. Here we are assuming that you are following the common practice of casting the working face of the mold or die against a chill to obtain a dense surface which can be given the desired polish or finish. Also, to be effective, the iron to be inoculated should be at a temperature of 2650° F or more. Reduce the entering silicon content in the charges 0.50 to 0.75 per cent, and then add the equivalent amount in the form of crushed ferrosilicon in the ladle. This procedure should result in a higher total carbon iron which should be more resistant to thermal shock.

You might also try variations in heat treatment and observe the effects. It may be that annealing at a temperature around 1400° F and furnace cooling would prove more satisfactory than your present practice.

Has Trouble from Cold Shuts

QUESTION We have a small brass foundry in which we produce a few castings for our own use, and which is operated in connection with our gray iron foundry. We are sending you a defective brass casting which has the appearance of a cold-run, but it has us puzzled, and we will appreciate your comments. Casting

was made from all scrap, and melted in an oil-fired crucible furnace.

ANSWER Examination of the defective brass casting confirms your opinion that the defect is a cold shut. It often results from poor pouring practice in that the operator misses the sprue opening temporarily, or pours the metal too slowly. The trouble can be eliminated by insisting that the pourer keep the crucible lip as close to the sprue opening as possible, and then pour with a steady stream, maintaining a full sprue.

Production of Oxides of Lead

QUESTION We operate a plant in Chile where we fabricate lead and produce lead for solders and bearing metals. We are interested in obtaining information on the methods employed for manufacture of litharge and red lead and will appreciate any suggestions you may have.

ANSWER Although the operations involved in manufacture of litharge and red lead are considerably outside our field, we endeavored to obtain some information on the subject which might be of use.

Litharge is produced by heating lead in a reverberatory type furnace to a temperature of about 1900° F (1038° C) which is about 100° F (56° C) above the melting point of lead oxide. The latter forms and is pushed to one side or end of the furnace from time to time. When sufficient material accumulates, it is pushed or raked out of the furnace into conical pots. When cold, the litharge is ground to a finely divided state, and separated from any metallic particles by air separation.

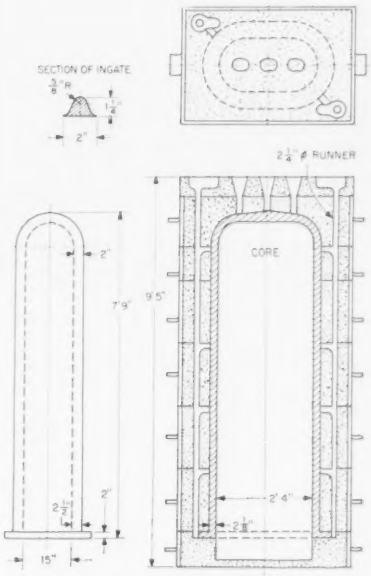
In another method, air jets are located beyond the bridge wall of the furnace, and arranged to impinge on the surface of the molten bath in such a manner as to drive the molten litharge to one end of the furnace. There it flows off into the conical pots. Height of the molten bath in the furnace is maintained by a small stream of molten lead—presumably supplied from another furnace.

Red lead, as you undoubtedly know, is formed by oxidizing litharge. The litharge is calcined in muffle-type furnaces with the admission of excess air. Temperature must be controlled at about 645° F (340° C), and the time of conversion is approximately 48 hours.

Must Resist High Temperature

QUESTION We are enclosing a sketch of cast iron retorts we manufacture for the rayon industry for production of carbon disulfide. The retorts operate at 900 to 950° C (1650 to 1740° F) to produce the reaction between carbon and sulfur. Retorts are oil fired. Composition of the iron is 2.8 to 3.1 per cent TC, 2.1 to 2.9 per cent Si, 0.5 to 0.7 per cent Mn, 1.2 to 1.4 per cent Cr, and 0.32 to 0.4 per cent P. Present performance of a retort is 1500 hr before being discarded. After every 15 days the retorts are taken out of service for minor repairs and internal lining. We will welcome suggestions to improve the service.

ANSWER While you do not mention the reason for discarding the retorts, it presumably is due to the progressive scaling which reduces the wall thickness to a point beyond which it is not considered safe to operate. The operating temperature range of 900 to 950° C (1650 to 1740° F) is extremely high, and it appears to us that a service life of 1500 hr is not to be disparaged.



Retort for making carbon disulfide is subjected to high temperatures

Since chromium is a strong carbide stabilizer and reduces scaling and growth at elevated temperatures, it is suggested that you try increasing the content above that now contained in the castings. Information in the literature indicates that a content of around 4 per cent should serve in the temperature range you mention. Another possibility of increasing the service life of the retorts is to spray a coating of aluminum on the exterior. That can be accomplished with metallizing guns using oxy-acetylene flame to melt and spray the aluminum, which may be in wire or powder form.

Wants Information on Cupola

QUESTION We operate a foundry in South America, and our 30-in. ID cupola melts 2 tons an hour. We would like to know the maximum weight of castings which could be poured from the cupola, and if there is a general rule which can be applied for such estimation. We also would like information on size of blower, number and size of tuyeres, height of tuyeres above bottom, etc.

ANSWER Your cupola seems to be melting rather slowly since one lined to 30 in. usually will melt from 3 to 3½ tons an hour. With an iron-to-coke ratio of 8:1 and melting at the rate of 3 tons an hour, the blower should supply about 1650 cu ft of air a minute, and at a melting rate of 3½ tons an hour the amount of air should be about 1925 cu ft a minute. If the iron-to-coke ratio is only 6:1, the quantity of air required would be increased to 2200 and 2565 cu ft a minute for the respective melting rates.

Tuyere area of the cupola should be about 15 per cent of the cross sectional area of the cupola, or 106 sq in., and six tuyeres 3 in. high and 6 in. wide should serve. Coke bed should be 40 to 48 in. above the tops of the tuyeres. Coke splits between charges should be standardized at 60 lb, and the iron charges varied to obtain the most satisfactory operating ratio. You might try starting with an 8:1 ratio or 480 lb of iron, and then decrease it or increase it accordingly.

Tuyere height above the bottom may be from a few inches to as much as 24 in. or more, depending on the amount of iron carried or held in the well. The slag hole is located about 4 in. below the tuyeres. Since the well is filled with coke, only about half its cubic content is available for holding iron, and in a 30-in. cupola each inch in height will carry 90 lb

iron. Hence, if you desire to hold 900 lb of iron in the well between taps, the tuyeres should be 900 divided by 90 plus 4 or 14 in. above the bottom.

As to the largest size casting which can be poured from a cupola melting 3 tons an hour, it depends on the temperature drop during the period of accumulating the required quantity of iron to pour the casting. In the case of large castings it is not unusual for molten cupola metal to be held several hours. Ladles usually have thick linings and are heated to as high a temperature as possible before receiving the iron. Surface of the molten metal is covered with charcoal screenings to keep heat loss at a minimum.

We believe that with a well insulated ladle heated to high temperature prior to use, and iron over the spout at 2650 or 2700° F, you could hold the iron long enough to gather sufficient metal to pour a 3-ton casting—that is, for at least an hour.

Iron Manifold Gives Trouble

QUESTION We are having trouble with an exhaust manifold casting poured in an oil sand core in that cold shuts occur in a 3/16-in. section of an interior cavity which must be leakproof. We are pouring at approximately 2800° F, and the iron has an analysis of 3.45 per cent TC, 2.0 per cent Si, 0.6 per cent Mn, 0.100 per cent S, and 0.10 per cent P. Do you know of any material we could use in the ladle to increase the phosphorus? We use a 200-lb ladle. What percentage of phosphorus do we need to get an increase in flowability. If a treatment of this type would improve flowability, any information on the source of a compound will be appreciated.

ANSWER Although it would not be difficult to increase the phosphorus content of your iron through addition of ferrophosphorus in the ladle, we believe that your problem is not due to a lack of fluidity. For your information, ferrophosphorus contains from 17 to 26 per cent P, and the melting point is around 2300° F. Also it might be pointed out that phosphorus is only half as effective as carbon in increasing the fluidity or flowability of gray iron.

According to an investigation on "Factors Affecting Fluidity of Cast Iron" by Porter and Rosenthal in *Transactions* of the American Foundrymen's Society, 1950, a close estimate of fluidity of hypoeutectic gray irons can be obtained by use of the formula, 14.9 F plus 0.05 T minus 155, where F is a composition factor (C plus P/2 plus Si/4) and T is the pouring temperature in degrees F. With the composition and pouring temperature mentioned, the fluidity would be 44.6 in. as measured by a modified spiral fluidity test. It would seem that such fluidity would be satisfactory for thin sections.

From the formula it is easy to ascertain that increasing the phosphorus from the present 0.1 per cent to 0.30 per cent (we doubt that you would want to go beyond that amount), the increase in fluidity would be 1.4 in. or from 44.6 to 46 in. The same increase can be obtained by raising the carbon from the present 3.45 per cent to 3.55 per cent. It might be pointed out that temperature has the most potent effect on fluidity—each decrease or increase of 100° F results in a decrease or increase of 5 in. in the length of the fluidity spiral.

As mentioned earlier, we believe that your difficulty is something other than fluidity. We suggest that you investigate the gating system to determine whether or not the metal flows freely into the section in question.

Gives Data on Plaster Molds

QUESTION We have seen references to plaster molds used for producing castings, and will appreciate information on the composition of the plaster and the amount of water used.

ANSWER Plaster of paris or gypsum compositions used as a mold material for production of metal castings is commonly termed "metal casting plaster." It is composed of gypsum and fibrous talc or steatite in the ratio of 4 lb gypsum to 1 lb talc. The materials may be obtained separately, but can be purchased already mixed. If the materials are purchased separately they are mixed together in the dry state before use.

The plaster is used in the liquid state for making molds, and the procedure is to sprinkle the dry plaster on top of the water and allow it to sink. Usual proportions are 1.4 to 1.7 lb of water to 1 lb plaster depending on the consistency or liquidity desired. Water preferably is warm. After the plaster sinks into the water, the mixture is stirred until it starts to cream or thicken. Then it is poured into the flask or container surrounding the pattern. The mold is permitted to air-set for 15 to 30 minutes, removed from the pattern and then dried in an oven to remove the excess moisture.

Time required for drying will depend on the temperature, and may be 18 hours or more at 400° F, or 1½ hours at 1450° F. Molds should be warm when the molten metal is poured. If they are allowed to become cold, moisture is picked up.

Wants Soil Pipe Information

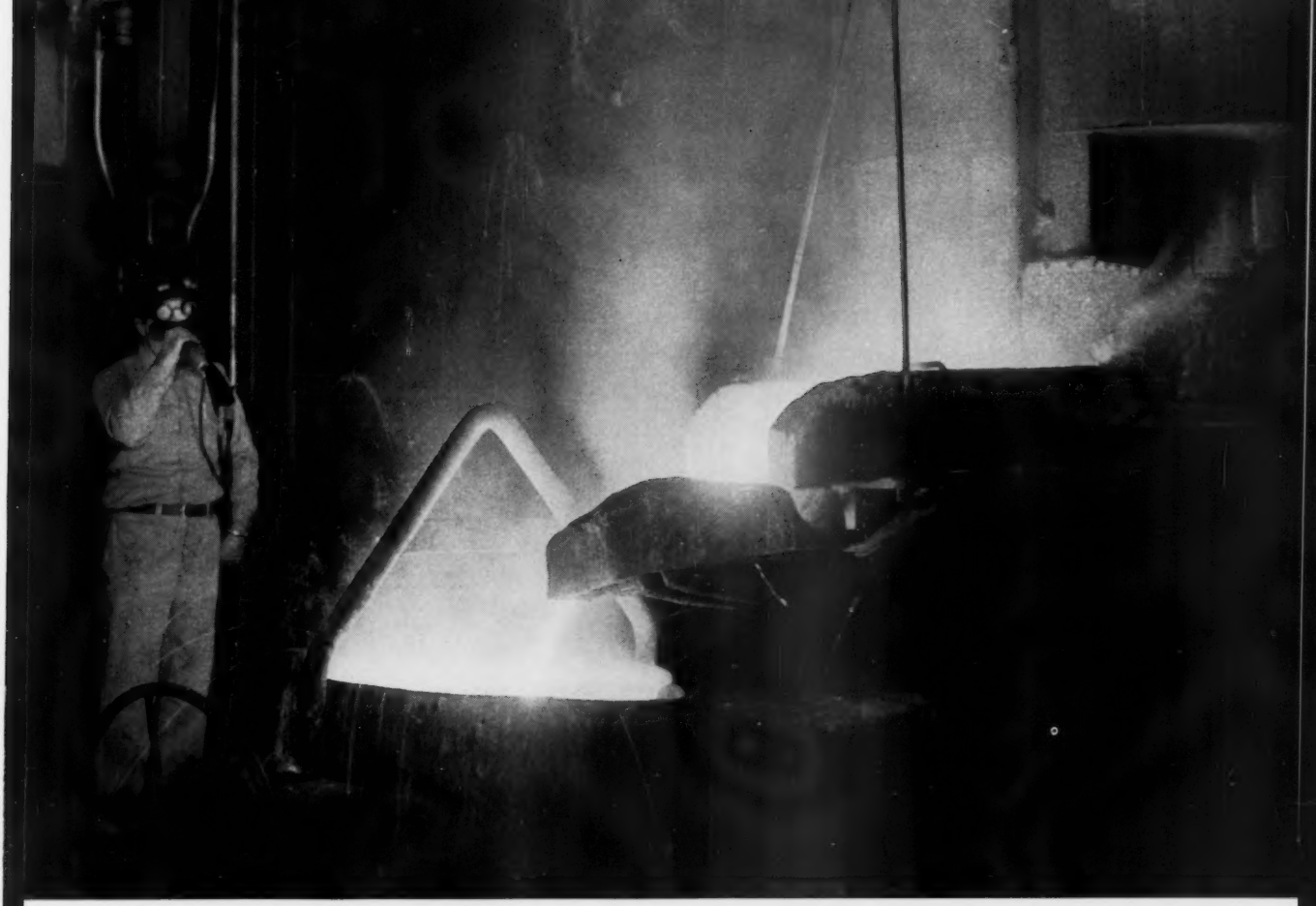
QUESTION We are interested in securing a book treating the manufacture of cast iron soil pipe. Book must include all phases of the green sand process as well as metallurgy.

ANSWER Although brief articles on different phases of soil pipe production have been published from time to time, we do not know of any book on the subject. Detailed information on the manufacture of soil pipe would take considerably more space than at our disposal and we can only provide a brief summary. While composition of the iron used may vary to some extent, a general average would show about 2.25 per cent Si, 0.90 per cent P max, 0.60 per cent Mn, and 3.35 per cent TC.

Pipe with either bell and spigot or two bell ends is made in close-fitting cast iron or steel flasks. Pipe up to 6 in. diam is mounted in pairs and over that singly. Sprues and gates usually are arranged to take metal from a large elongated, multi-lip ladle suspended from a crane or monorail. Central runner between two castings feeds thin flat gates spaced about 2 in. apart. Four sprues equidistantly spaced are used.

Mold preparation practice varies. In some foundries the pattern is dropped part way through a stripping plate before the half mold is lifted. In others the half mold is lifted directly from the rigid pattern and plate. A small fillet at the joint line insures a clean lift, and a vibrator attached to the plate is kept in operation during the lift.

Pipe cores are made on cast iron or steel pipe arbors perforated with numerous closely-spaced vent holes. Ends of the arbors are machined and fit closely in circular openings in each end of the flasks. Arbors are clay washed or dipped in water and placed on a stand under a hopper containing finely screened sand. The stand is provided with bearings to fit the turned ends of the arbors. Arbor is revolved by a hand crank or through a simple clutch by mechanical means. Bottom of the hopper is a long narrow slot the same length as the desired core, and a thin stream of sand is allowed to fall onto the revolving arbor. Distance between the bottom of the hopper and arbor is about 3 ft and the height of fall causes the sand to adhere satisfactorily. A flat blade mounted on the stand parallel to the axis of rotation regulates the thickness of sand on the arbor and imparts the correct shape for the bell ends and desired smoothness. Cores are not coated and are used in the green state.



50 points of Moly = 7000 psi

Moly makes it easy to increase strength of cast iron. Made at the spout, or in the ladle, small Moly additions require no change in the character of the charge, normal melting practice, or the base metal.

More and more foundries find Moly the *practical* way to add strength and toughness to gray cast iron.

For Moly is easy and convenient to use. It allows continuous cupola operation, even when a special job calls for high-strength iron. It's one reason why, in 1956, the use of Moly greatly increased, even though cast iron sales generally declined.

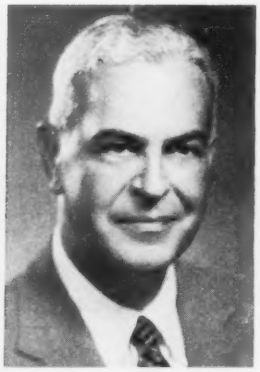
If the use of Moly for high-strength iron isn't already standard practice in your shop, it will pay you to get the full story of how to upgrade iron, without changing normal practice. Write now for our series of bulletins "Why Moly Iron". Climax Molybdenum Co., Dept. 50, 500 Fifth Avenue, New York 36, N. Y.

CLIMAX MOLYBDENUM

Circle 625 on Page 51

Men of Industry

● THOMAS R. WILTSE
. . . division plant mgr., GMC



● JAMES P. RAUGH
. . . heads Refractories Div.

● LARSON E. WILE
. . . becomes foundry supt.

● CHARLES E. PETERSON
. . . mfg. operations mgr.

THOMAS R. WILTSE has been named plant manager, Central Foundry Division, General Motors Corp., Defiance, Ohio, succeeding **Gordon S. White,** who has been promoted to General Motors' committee for educational grants and scholarships. Mr. Wiltse held supervisory positions at the Saginaw Malleable Iron Plant, Saginaw, Mich., and in 1955 became manufacturing superintendent there. He was granted a leave of absence last year to attend Massachusetts Institute of Technology on a Sloan Fellowship in the School of Industrial Management.

Albert H. Clarke was recently named vice president-manufacturing, Crouse-Hinds Co., Syracuse, N. Y. **Russell P. Northup** has succeeded Mr. Clarke as vice president-engineering. **John B. Crosby,** assistant to the president, takes over Mr. Northup's former duties as Condulet sales manager, and **William A. McAuley** has been named new products manager in the sales division.

Oscar Goppelt has been named chief executive officer, Kasper Foundry Co., Elyria, Ohio, succeeding the late Emil Kasper, former president. **Ernest Kasper** takes over Mr. Goppelt's former duties as vice president. **Mary Kasper,** president, will act in an advisory and consulting capacity.

Fred Barish has been transferred to the New York office, Luria Bros. & Co., Philadelphia, as special assistant to the president. Mr. Barish has been manager of the company's Los Angeles office.

● **James P. Raugh** has been named vice president-general manager, Refractories Division, H. K. Porter Co., New York. For 25 years Mr. Raugh was associated with General Refractories Co., Philadelphia, where he was general sales manager, general works manager, and later vice president. He resigned in 1953 and became president, Fleming, Raugh Inc., a Philadelphia construction company, and vice president, Frank Samuel & Co., a manufacturing firm.

● **Larson E. Wile** has joined Wysong & Miles Foundry Inc., Greensboro, N. C., as foundry superintendent. A graduate of Missouri School of Mines and Metallurgy, he was formerly associated with the Research and Development Dept., Lynchburg Foundry Co., Lynchburg, Va. He has specialized in sand research for casting various types of metals and has served as vice chairman of the Gray Iron Research Institute sand committee. He is currently serving on the AFS Sand Division's committee on chemical control of molding sands.

E. F. Myers, president-chairman, and **Mrs. Mabel G. Brace,** vice president and treasurer, Ironton Fire Brick Co., have moved to the general offices of the company in Ironton, Ohio. They were formerly located in Jacksonville, Fla., where **George W. Andre** will continue to maintain an office for sales and service.

Arthur Shelton has been appointed regional manager for the Chicago area, Coles Cranes, Joliet, Ill.

● **Charles E. Peterson** has been appointed manager of manufacturing operations, Mackintosh-Hemphill Div. of E. W. Bliss Co., responsible for manufacturing activities at the division's plants in Pittsburgh and Midland, Pa. He succeeds **John Lindberg,** who has been named manager of the parent company's Canton Division. **Richard Y. Moss,** former Canton division manager, has been made manager of special product sales for Bliss. Mr. Peterson joined Mackintosh-Hemphill in 1949 and became chief metallurgist in 1954.

A. D. Foote has been named assistant director of purchases, **Allis-Chalmers Mfg. Co.,** Milwaukee, succeeding **C. H. Norton,** who retired recently after 31 years of service. A graduate of Leland Stanford University, Mr. Foote joined the firm in 1936. He will continue as West Allis works purchasing agent, a position he has held since 1953.

Harold F. Ehrhart, plant manager, Lukenheimer Co., Cincinnati, recently completed 40 years with the company. Beginning as a lathe operator and clerical assistant, he advanced to production manager in 1945, superintendent in 1951, and plant manager in 1953.

Stanley Marwin has been appointed assistant works manager of the Los Angeles plant, American Manganese Steel Division, American Brake Shoe Co., Chicago Hgts., Ill. With American Manganese since 1934, he has held production and su-

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ARE WHITING CUSTOMERS

metalworking
More melt per man-hour
for the nation's foundries
with efficient WHITING
FOUNDRY EQUIPMENT
More than 90% of the nation's cast iron is melted in Whiting Cupolas. Higher quality melt is obtained with Whiting Electric Furnaces, Hot Blast and Charging Equipment. Tumbling mills, air furnaces, annealing ovens, transfer cars, pulverizers, turntables and cupola spark suppressors manufactured by Whiting also contribute to efficient foundry operations.
Whiting Ladles
There is a great variety of Whiting Ladles to meet all requirements in foundry operation.

Looking for new ways to cut costs?

Send for this booklet! See how Whiting Foundry equipment — electric furnaces, cupolas, ladles and many other cost-cutting products can provide new efficiency for your operations. Read "Working for Profit in Every Industry", the new, pocket-size booklet which explains why the majority of America's leading corporations specify Whiting products. There's other helpful information here, too . . . on Whiting Cranes . . . on Trambeam Overhead Systems . . . in fact on every Whiting product used in your type of industry. Write today for a copy of "Working for Profit", *Whiting Corporation, 15607 Lathrop Avenue, Harvey, Illinois.*

WHITING

FOUNDRY EQUIPMENT

MANUFACTURERS OF CRANES; TRAMBEAM HANDLING SYSTEMS; TRACKMOBILES; METALWORKING AND CHEMICAL PROCESSING EQUIPMENT

● I. W. WILSON

● FRANK L. MAGEE

● HAROLD C. ERSKINE

promotions announced by Alcoa

● LOUIS E. DORMAN
. . . industrial relations mgr.

pervisory positions at various division plants, recently as assistant to the works manager in Los Angeles.

● **I. W. Wilson** has been elected chairman of the board and **Frank L. Magee,** president, Aluminum Co. of America, Pittsburgh. **Harold C. Erskine** has been made vice president-general production manager. Three new directors have been named: **M. M. Anderson,** Alcoa vice president of personnel and industrial relations; **Ralph V. Davies,** vice president-general sales manager; and **George W. Wyckoff,** vice president, T. Mellon & Sons, Pittsburgh. President since 1951, Mr. Wilson succeeds **Arthur V. Davis,** who retired recently. Mr. Magee has been executive vice president of the company since 1955. Mr. Erskine was manager of the Cleveland works from 1943 until 1952 when he became assistant general manager of the company's die casting division.

● **William A. Illsley,** for the last four years sales engineer in the Detroit territory, Wheelabrator Corp., Mishawaka, Ind., has been appointed Cincinnati district manager. He succeeds the late Russell Duer. **William E. Scherrer** has been named sales engineer in Cincinnati. He was formerly owner of S & H Foundry Corp., Mishawaka. Other Wheelabrator staff changes include **Francis E. Noyes,** district manager, and **Wayne L. Hungate,** sales engineer, St. Louis; **George F. Burditt,** manager, steel mill equipment sales division, Mishawaka; **Joseph F. Underway,** Pittsburgh district manager, and **John B. Booth,** sales engineer, Los Angeles.

Robert W. Bond has been named manager of the sales service department, Corn Products Sales Co., New York. For the last four years he has been manager of technical sales at the company's Argo, Ill., plant. Previously he was plant chemist at the Corpus Christi, Tex., plant.

● **Howard F. Barrows** retired recently as advertising-sales promotion manager, Austin-Western, Construction Equipment Div., Baldwin-Lima-Hamilton Corp., Aurora, Ill. He joined the sales department of the former Austin Mfg. Co. in 1911 and in 1921 became director-advertising and sales promotion, retaining the position when it was acquired by Baldwin-Lima-Hamilton.

● **Louis E. Dorman** has been appointed manager of industrial relations, American Steel Foundries, Chicago, succeeding **Edward J. Walsh,** who retired recently after 44 years of service. Both men started in the accounting department of the company, Mr. Dorman becoming assistant manager in 1952, and Mr. Walsh manager of industrial relations in 1944.

Richard W. Holmes has been named sales manager of the eastern division, north, E. F. Houghton & Co., Philadelphia, with headquarters in Worcester, Mass., succeeding **O. R. Kerst,** who has resigned. **Lewis R. Tharp** has been appointed assistant sales manager of the Detroit sales division, operating out of Cleveland.

● **H. C. Wallace,** formerly assistant sales manager, has been named sales manager of the southern region, Air Reduction Sales Co., New York, with

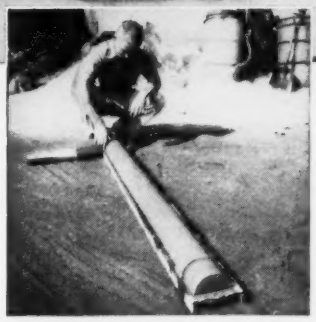
● WILLIAM A. ILLSLEY

● WILLIAM E. SCHERRER

Wheelabrator Corp. sales appointments

● HOWARD F. BARROWS
. . . retires, Austin-Western

● H. C. WALLACE
. . . regional sales mgr.



Particularly Difficult Core forms downspout for building drainage. "Thanks to excellent dry strength of Cities Service Delco #936 Core Oil, we never have problems," says Dallas.

Pipe This! Dallas Foundry makes thousands of castings for water pipes. Same Cities Service Core Oil—Delco #936—is used to make cores for these as for small cores in main illustration above.

"One core oil for all whether big or small"

All jobs go to Cities Service Delco #936 at Dallas Foundry, Dallas, Texas

Well known for its municipal, industrial, and structural castings, Dallas Foundry's daily tonnage runs about 20-25 tons.

Yet while its castings are by no means the same, its core oil is always the same . . . Cities Service Delco #936.

"This one oil does all our jobs perfectly and eliminates error of application and storage problems often encountered with several oils," says Vice President R. G. Whittington.

"Excellent service has further reduced storage. Sometimes we're able to stock only one barrel of Delco #936, knowing that we can have an order delivered by Cities Service in six hours or less."

Mr. Whittington has added his voice to the growing number of foundrymen who report outstanding service, quality, and range of application with Cities Service Delco Core Oils.

If you'd like the full story of these unique core oils along with a recommendation of which is best for you, talk with a Cities Service Lubrication Engineer. There's no obligation. Or write: Cities Service Oil Company, 20 North Wacker Drive, Chicago 6, Illinois.

CITIES SERVICE

QUALITY PETROLEUM PRODUCTS

Circle 627 on Page 51

● GEORGE JOHNSTONE III

● CHARLES L. MASSON

● HAROLD GASSNER

Johnstone Foundries appointments

● DONALD A. SANDSTEDT
. . . joins Michigan Industries

headquarters in the Houston office. He succeeds **M. G. Wicker,** resigned. **A. W. Gilpin** has been appointed assistant to Mr. Wallace. **R. Pringle** takes over Mr. Gilpin's former duties as assistant sales manager.

● **George Johnstone III** was recently elected vice president, Johnstone Foundries Inc., Grove City, Pa. A graduate of Duke University, he returns to the company after two years of Navy service. **Charles L. Masson,** production manager for the last five years, has been named foundry superintendent. **Harold Gassner,** formerly vice president, Rosedale Foundry & Machine Co., Pittsburgh, has joined the company as sales manager. Mr. Gassner is a former president of the Pittsburgh Foundrymen's Association.

● **Paul von Colditz,** elected chairman of the Eastern Canada Chapter of the AFS for 1957-58, is works manager, Canadian Car & Foundry Co. Ltd., Montreal, Que. He attended Bishop's College School, Lennoxville, Que., and joined Canadian Car's steel foundry division in 1938 where he worked in the pattern department. Following military service he returned to the company as a training foreman, became assistant works manager in 1955, and works manager earlier this year. Mr. von Colditz is vice chairman of Division 1, Steel Founders' Society of America.

John Betzhold of Ross Cook Inc., Los Angeles, has been appointed representative in the southern California area, Spencer Turbine Co., Hartford, Conn. He is a graduate of University of Minnesota.

● **John G. Farabaugh** recently joined Wheelabrator Corp., Mishawaka, Ind., as director of industrial relations, a newly created post. He is a graduate of University of Notre Dame.

● **Donald M. Miller** has been elected executive vice president, Airborne Instruments Laboratory, Mineola, N. Y. He joined the laboratory in 1942 when it was sponsored by Columbia University and the government, and since 1946 has been vice president in charge of the engineering and production division of the company.

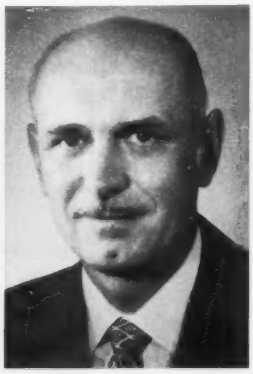
● **Donald A. Sandstedt** has joined Michigan-Standard Alloy Casting Co. and Misco Fabricators, divisions of Michigan Industries Co., Detroit, as manager of sales for Chicago, Milwaukee, and Wisconsin, with headquarters in Chicago. A graduate of University of Illinois, he spent several years as assistant to the vice president, Alloy Engineering & Casting Co., Champaign, Ill. Recently he was senior cost analyst at the Ford Aviation plant, Chicago.

Harry H. Kessler and **Victor M. Onet** were recently named directors, Chromalloy Corp., White Plains, N. Y. Mr. Kessler is president, Sorbo-Mat Process Engineers, St. Louis, and Sorbo-Cast Corp., New Brunswick, N. J. Mr. Onet is a vice president, General Builders Supply Corp., New York.

● **Julian A. Terpenning,** formerly technical service engineer in the Lancaster, Pa., area, Foundry Products Div., Archer-Daniels-Midland Co., Cleveland, has been named product manager, foundry resins, at the company's resin laboratory, Newark, N. J. Before he joined the division

● PAUL VON COLDITZ
. . . heads E. Canada Chapter

● JOHN G. FARABAUGH
. . . joins Wheelabrator Corp.



● DONALD M. MILLER
. . . becomes executive v. p.

● JULIAN A. TERPENNING
. . . division product mgr.

BETTER CORES...FASTER...
FEWER PLATES...LESS SPACE

Thermex
ELECTRONIC CORE-BAKING EQUIPMENT

Better cores. Lebanon Steel Foundry, Lebanon, Pa., has improved uniformity, hardness and tensile values of cores with THERMEX* Core Baking Equipment. Require less filing and fitting. Breakage nil. Spraying eliminated.

Faster production. Here, conveyor into THERMEX Unit extends 20 ft. to allow core makers to load from their stations. Dielectric heating has boosted output from 1600 to 4500 cores per shift. Estimated yearly savings: $10,000. At Repcal Brass Manufacturing Co., Los Angeles.

Fewer plates. Continuous flow of cores speeds turnover of core plates. Fewer plates are needed and being of plywood, they are cheaper. This core room cut core driers from 400 to 35. At James B. Clow & Sons, Coshocton, Ohio.

Less space. This is one of two 30 KW THERMEX Core Baking Units at Bendix Foundries, Bendix Aviation Corp., Teterboro, New Jersey. Entire baking operation is concentrated in small area. Continuous flow minimizes need for core storage. Special core runs can be made quickly.

*THERMEX—Trade-Mark Reg. U. S. Pat. Off.

The **GIRDLER** Company

A DIVISION OF NATIONAL CYLINDER GAS COMPANY

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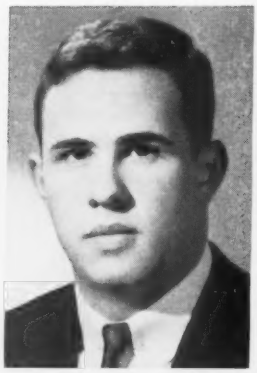
Sales Offices: 76 Beaver St., New York 5, N.Y. • 133 So. Clinton Ave., Rochester 4, N.Y. • 505 Delaware Ave., Buffalo 2, N.Y.
239 Newton Ave., Newark, Ohio • 624 So. Michigan Ave., Chicago 23, Illinois • 714 West Olympic Blvd., Los Angeles, Calif.

Circle 628 on Page 51

● GEORGE T. DUPRE
. . . becomes general sales mgr.

● HARRY S. SCHWEINSBERG
. . . assistant gen. sales mgr.



● THOMAS S. JENKINS

● GALE H. SHACKELFORD
Canton Chaplet promotions

last year Mr. Terpenning was with Shell Process Inc., Chicopee, Mass., Borden Co., New York, Metal & Alloy Specialties Co., and Curtiss-Wright Corp., both of Buffalo.

● **George T. Dupre,** for the last year assistant to the president, National Engineering Co., Chicago, has been appointed general sales manager. Since joining the company in 1950 he has served as process engineer, advertising manager, assistant sales manager, and sales manager of National Dust Collector Corp., a subsidiary. Previously he represented National Engineering Co. for C. P. Guion Associates, foundry equipment sales representative.

● **Kent S. Clow Jr.,** assistant vice president and a director, James B. Clow & Sons Inc., Chicago, has been elected vice president and a director, Iowa Valve Co., Oskaloosa, Iowa, a Clow subsidiary.

● **Robert E. Fleming** has been elected executive vice president of the Industrial Heating Equipment Association, succeeding **Carl L. Ipsen,** who has retired. Until recently Mr. Fleming was associated with the Metalworking Equipment Division, Business & Defense Services Administration, Washington.

● **Harry S. Schweinsberg** has been appointed assistant general sales manager, Harbison-Walker Refractories Co., with headquarters at the home office in Pittsburgh. Engaged in sales work with the company since 1924, for the last seven years he has been Philadelphia district sales manager.

George J. McNew has established a management consultant firm under his own name at 3475 W. Rosedale, Ft. Worth, Tex., to serve the metal, metalworking and machinery industries. Mr. McNew recently was vice president, A. Brandt Co., Ft. Worth, and before joining that company four years ago was vice president, American Saw & Tool Co., Louisville, Ky.

● **Joseph M. Franz** has been appointed Philadelphia district sales manager, Harbison-Walker Refractories Co., Pittsburgh. With the company since 1924, he was recently in the Detroit district office.

● **Thomas S. Jenkins** has been named vice president, Canton Chaplet & Chill Div., W. L. Jenkins Co., Canton, Ohio, in addition to his duties as secretary. **Gale H. Shackelford,** formerly sales manager of the company, has been made vice president-sales.

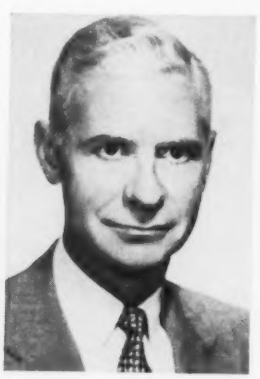
W. J. Hannon, formerly St. Louis district representative, Leschen Wire Rope Div., H. K. Porter Co., St. Louis, was recently appointed Chicago district sales manager to cover Michigan, Wisconsin, Minnesota, North Dakota, eastern Iowa, and northern Illinois and Indiana.

● **William R. Post** has been appointed sales engineer, Empire Steel Castings Inc., Reading, Pa., to cover eastern Pennsylvania. He is a current director and past vice president, Infants Socks Inc., New York.

C. P. McCormick has been appointed Baltimore district manager, Jervis B. Webb Co., Detroit. He joined the company in 1953 as an estimator and has worked in sales since 1954. **Thomas D. Winter Jr.** has been named Detroit sales representative

● KENT S. CLOW JR.
. . . Iowa Valve Co. v. p.

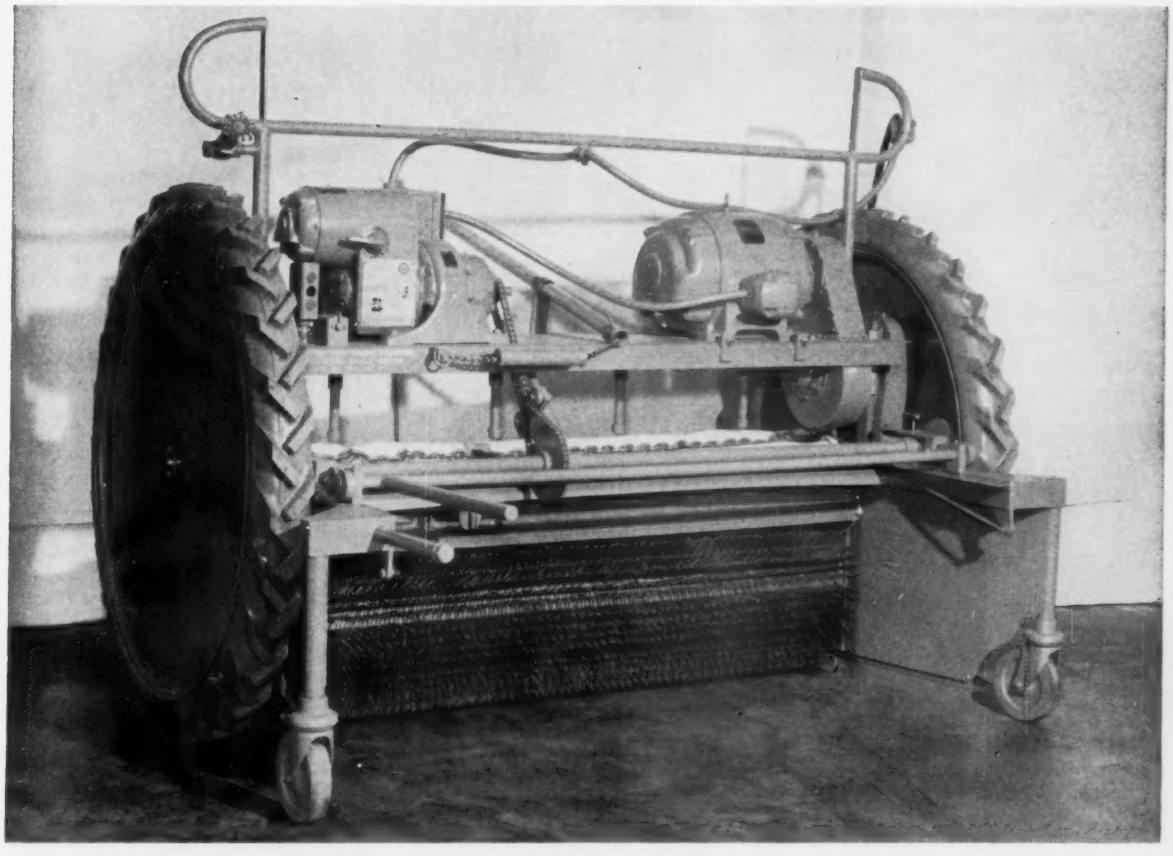
● ROBERT E. FLEMING
. . . executive v. p.



● JOSEPH M. FRANZ
. . . district sales mgr.

● WILLIAM R. POST
. . . joins Empire Steel

IN TUNE WITH THE TIMES
WITH *"The Moulders' Friend"*



Costs rise higher and higher every year. To keep in tune with the times we must find cheaper ways to do the job better.

Foundrymen who use The Moulders' Friend sand conditioner agree that the thousands of flat tempered steel wires in the brush revolving at high speed do the most thorough job of mixing and aerating sand heaps on the foundry floor.

The Moulders' Friend is completely self-propelled. It has a capacity of two tons of thoroughly conditioned sand per minute with travel speeds up to 50 feet per minute. One man does the job.

A screen for removing trash and tramp iron and a water dispenser for accurately wetting down the sand as the machine travels over the heap are valuable added features.

The Moulders' Friend fits your foundry. Being carried on two large wheels it turns short and handles well in the crowded foundry.

The Moulders' Friend will help you keep in tune with the times by paying for itself with better castings and less labor cost. Investigate this remarkable machine today. See one in operation. Valuable information is yours for the asking. Please write for bulletin F.

THE BRUSH DOES THE JOB

"The Moulders' Friend" • **Dallas City, Illinois**

Circle 629 on Page 51

MEN OF INDUSTRY

● AUBREY M. CALLIS
. . . general sales mgr.

● A. V. MOROZ
. . . Thor sales mgr., Chicago

● MARK T. GILKISON
. . . division sales mgr.

● M. J. GRUHLER
. . . heads Toledo Chapter

for Webb, replacing **Robert Rumsey,** who has been made log handling industry representative in Canada. Mr. Winter has been engaged in estimating and engineering work for the company for the last six years.

● **Aubrey M. Callis** has been appointed general sales manager, Federated Metals Div., American Smelting & Refining Co., New York, replacing **Edgar L. Newhouse III.** Mr. Callis served as manager of various Federated plants and was placed in charge of the general sales department in 1948. Recently he has been in charge of production at the division's plant in Newark, N. J. Mr. Newhouse has been named Washington representative, succeeding **C. J. Williamson,** who becomes a company consultant. **John L. Griffith** has been appointed sales manager and **E. J. Baker,** assistant sales manager of the Eastern Division. **J. L. Kammermeyer** becomes general sales manager of the division's new central aluminum department in St. Louis. **Robert A. Colton,** formerly assistant sales manager of the Eastern Division, replaces Mr. Kammermeyer as manager in Houston. Mr. Colton joined the parent company in 1946. He was placed in charge of research and development of copper-base casting alloys, becoming assistant sales manager in 1954.

Robert H. Narel was recently appointed Cleveland district service manager, Lindberg Engineering Co., Chicago, replacing **Robert Lafferty,** who has been appointed sales manager of the company's San Francisco territory.

G. E. Smith and **P. D. Deeley** have been appointed sales engineers in the Pittsburgh region, Electro Metallurgical Co., division of Union Carbide Corp., New York. **R. L. MacCallum Jr.** has been named sales engineer in the Chicago area.

● **A. V. Moroz** has been appointed electric tool sales manager for the Chicago branch, Thor Power Tool Co., Chicago, succeeding **Arthur H. Nelson,** who has retired after 23 years with the company. Mr. Nelson has been Chicago branch sales manager since 1952. Mr. Moroz joined the Chicago branch as service engineer in 1954. **James P. Stine,** for the last year East Coast zone manager, has been named New York branch manager, taking over the duties of **W. J. McGraw,** recently named manager of Thor's electric tool division. Mr. Stine joined the company in 1948 as an electric tool service engineer in the New York territory.

● **Mark T. Gilkison** has been named manager of the Industrial Sales Div., Gates Rubber Co., Denver, succeeding **L. L. Carroll,** who has been transferred to sales duties on the West Coast. Mr. Gilkison has been with the company since 1939. He served as field engineer, market development engineer, hose sales manager, and for the last eight years has been assistant manager of the industrial sales division.

Thomas J. Machia has been appointed Texas representative, Alloy Precision Castings Co., Cleveland. **Paul Minter** and **Wayne Simpson** have been named sales representatives for the company in Oklahoma and southern Kansas. They are associated with Engineering Associates Inc. Mr. Machia will work from the Ft. Worth, Tex., office of Engineering Associates Inc., and Messrs. Minter and Simpson from its Wichita, Kans., office.

Malcolm R. Harris has been appointed eastern district sales engineer, Electronics and Instrumentation Div., Baldwin-Lima-Hamilton Corp., Philadelphia, with headquarters in New York. He will cover metropolitan New York, Long Island, and northern New Jersey. Mr. Harris has been assistant manager of market research at the division headquarters in Waltham, Mass., since he joined the company last year.

● **M. J. Gruhler,** president of the Toledo Chapter of the AFS for 1957-58, is superintendent, Plant No. 2, Unitcast Corp., Toledo, Ohio. He attended Toledo University and joined Unitcast in 1935. Prior to becoming superintendent he served as shipping clerk, cleaning foreman and molding foreman.

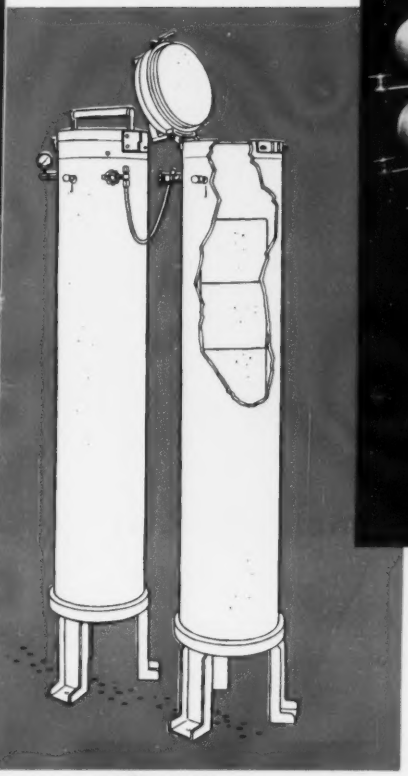
Maj. Gen. Roger J. Browne has been appointed director of defense products, American Brake Shoe Co., New York. Previously he was commander of the First Air Force with headquarters at Mitchell Air Force Base.

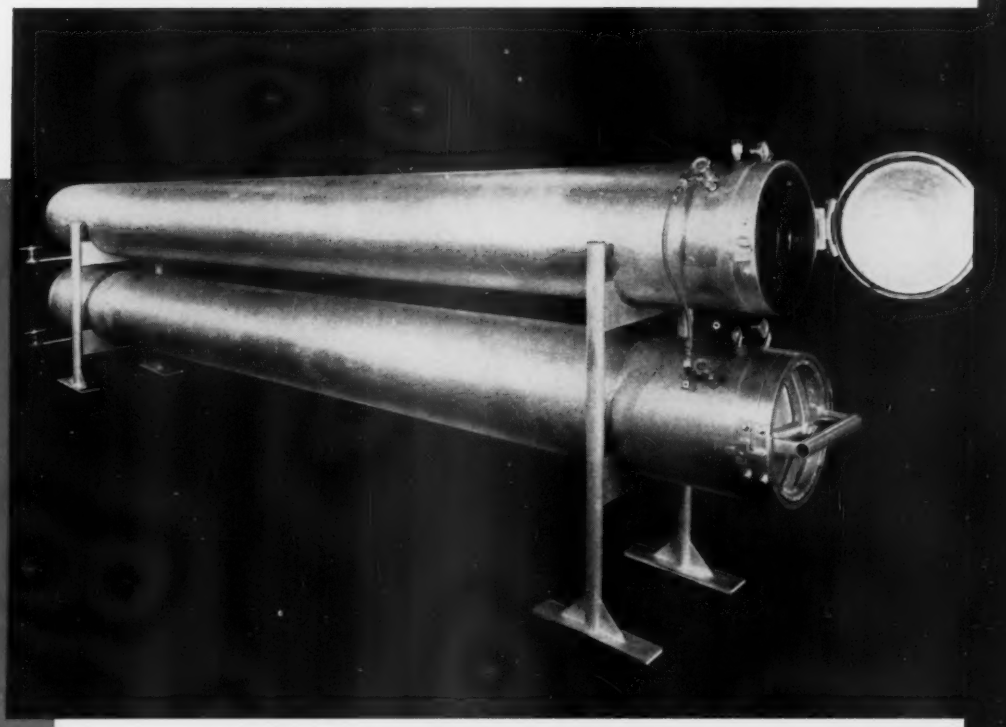
Robert B. Fulton has been named manager of the new district office of Allis-Chalmers Mfg. Co., Milwaukee, at 11 W. Monument St., Dayton, Ohio. **William F. Vander Mass** has succeeded Mr. Fulton as manager of the Cincinnati district. **James A. Sudduth** has taken over the managership of the Grand Rapids, Mich., district formerly handled by Mr. Vander Mass. Mr. Sudduth had been a sales representative in the Toledo, Ohio, district.

Ernest H. Holzworth has retired as president, Frontier Bronze Corp., Niagara Falls, N. Y. He has been president since he acquired the company in 1926. Mr. Holzworth began his career in the open-hearth department, Republic Steel Corp. Later he was associated with Jones & Laughlin Steel Corp., and American Rolling Mills. Prior to acquiring Frontier Bronze he built and operated the plant of Buffalo Sintering Co.

IN MAKING CORES WITH CO_2...

Carbon Dioxide from DRY ICE CONVERTERS Costs up to 75% LESS!





Thousands of DRY ICE CONVERTERS are in use in other industries using Carbon Dioxide, attesting the very REAL SAVINGS which are realized.

Additional DRY ICE CONVERTER ADVANTAGES

Dry ice converters are A. S. M. E. approved pressure vessels which may be charged with full-sized 50-pound blocks of solid carbon dioxide, commonly called "dry ice". This dry ice converts to gas, and then is drawn off through low-pressure piping to the point of use. Convenient, economical and safe, Dry Ice Converters are available in capacities up to 1000 pounds (equivalent to 8700 cu. ft. of gas). For further information write to . . .

- **Large storage capacity at any convenient location, indoors or out.**
- **Safe! Eliminates hazards of moving gas cylinders in and out of plant.**
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DRY ICE CONVERTER CORP.

DEPT. W BOX 1652, TULSA, OKLA.

DRY ICE CONVERTER CORP. TULSA, OKLAHOMA

Circle 630 on Page 51

Presentation of one of two top awards in the SFSA product development contest to Joe Jopling, project engineer, Ft. Worth, Tex. Left to right are Colin Carmichael, Howard F. Park Jr., Mr. Jopling, Roy A. Gezelius, F. Kermit Donaldson

STEEL FOUNDERS' SOCIETY

Makes Product Development Awards

By WILLIAM G. GUDE
Managing Editor

PRESENTATION of awards in its product development and safety contests featured the program for the 55th fall meeting of the Steel Founders' Society of America. The meeting, which attracted a record attendance of 350, was held at The Homestead, Hot Springs, Va., Sept. 23-24. Presiding was the society president, Howard F. Park Jr., General Steel Castings Corp., Granite City, Ill.

In opening the meeting with remarks of the president, Mr. Park stressed the need for developing a strong marketing program. Market development and technical research, he said, offer the principal tools for expanding the volume of steel castings business.

Market research activities of the society are being pushed in an effort to ascertain future prospects of present and potential customers. One research report—"Castings for Highway and Building Construction"—has been issued. It analyzes the effect of the federal highway program on road building equipment manufacturers and their probable requirements of castings. Four reports of

Donald N. Rosenblatt, center, Salt Lake City, Utah, is congratulated by Roy A. Gezelius, left, and George K. Dreher as another top winner

A NEAT TRICK...

ELIMINATE BRICK

we guarantee it with the

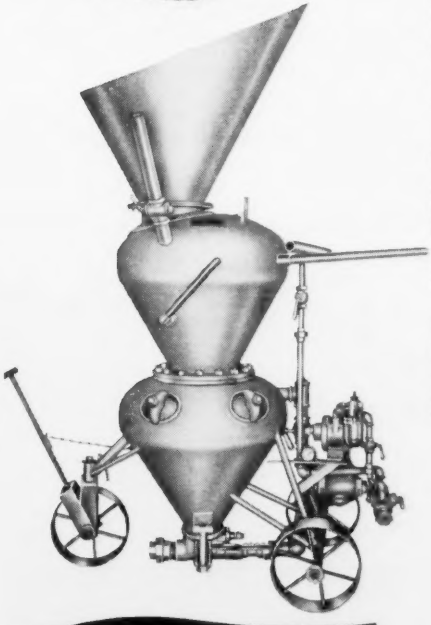
Blastcrete Gun

Hundreds of foundries all over the country . . . from the smallest to the largest . . . have eliminated the use of block and brick. This is accomplished by using a BLASTCRETE gun which shoots denser linings, faster (usually ⅓ the time of other type guns). The Blastcrete gun's ability to handle extremely damp materials (such as rebounds) is only one of its many outstanding features. So superior is the BLASTCRETE GUN that more and more companies have discarded the gun formerly used after a FREE trial run with this outstanding refractory gun in their own cupolas.

A FEW COMPANIES THAT HAVE CHANGED TO THE BLASTCRETE METHOD:

• American Brake Shoe • Food Machinery Corp. • International Harvester Co. • General Motors • Link-Belt Co. • Buffalo Pipe & Foundry Corp. • Calumet & Hecla, Inc. • The Howe Scale Co., Inc. • Rockwell Mfg. Co. • Charlotte Pipe & Foundry Co. • Pittsburgh Metallurgical Co. • Cushman Motor Works • Albany Car Wheel Co. • Brillion Iron Works • U.S. Pipe & Foundry Co. • Great Lakes Founders & Machine Corp. • J. B. Clow & Sons • National Malleable & Steel Castings Co.

Find out why hundreds of companies have replaced their air placement gun with Blastcrete.



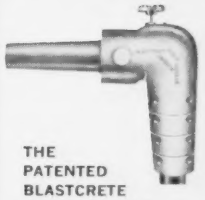
FREE TRIAL PROVES SUPERIORITY

A BLASTCRETE gun will be installed FREE in your plant on a NO OBLIGATION basis. Simply compare it with your present method or gun. Afterwards decide for yourself! Buy it or rent it . . . either way you'll want a BLASTCRETE!

BLASTCRETE RENTAL PLAN IS POPULAR

Many foundries choose the BLASTCRETE Rental Plan because the gun is used in the maintenance and repair of furnaces, ladles, etc., and can be written off as business expense.

Complete Information
Bulletin Upon Request



THE PATENTED BLASTCRETE ANGLE NOZZLE

Developed for use in small cupolas, ladles, electric and reverberatory furnaces, is adaptable to any air placement gun (fits any size hose) and is available at the extremely low cost of **$55.00**

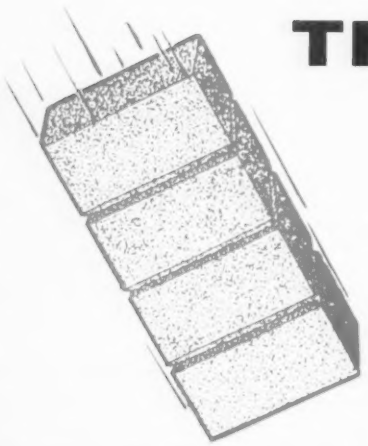
BLASTCRETE SERVICE COMPANY, Inc.

323 East 58th Street, Los Angeles 11, California

Circle 631 on Page 51

WHY

IS OUR FLUX BETTER THAN ANOTHER?



Famous CORNELL CUPOLA FLUX

BECAUSE . . . OUR flux* is composed of quality fluorspar and selected other materials.

BECAUSE . . . OUR flux* is scientifically designed to greatly increase slag flow off.

BECAUSE . . . OUR flux* guarantees complete cleansing of coke (giving carbon constant)

*Famous **CORNELL** **CUPOLA FLUX**

"often imitated but never equalled"

If you melt aluminum or brass, try Famous Cornell Aluminum and Brass FLUX.

Write for Bulletin 46-A.

The CLEVELAND FLUX Company

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Manufacturers of Iron, Semi-Steel, Malleable, Brass, Bronze, Aluminum and Ladle Fluxes—Since 1918

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this type, analyzing important outlets for steel castings, are to be issued annually.

To make these reports more useful, Mr. Park said that the Product and Market Development Committee planned to appoint a task force which would make an intensive, detailed study of the next research report and arrive at practical suggestions on how the individual foundry can put the report to best use.

Mr. Park reported progress in the technical and research project of SFSA in co-operation with representatives of oil refineries and the American Standards Association. It covers such subjects as magnetic particle inspection methods, quality standards and standards for visual and radiographic examination as applied to steel castings for valves and pressure fittings.

Contest Interest Growing — The quality improvement program of the Technical and Operating Committee also is being pushed. Interest in the society's annual product development contest is growing, the latest one attracting 84 entries. This contest is intended to reveal factors influencing the use of steel castings. Colin Carmichael, editor, *Machine Design*, and chairman of the judges committee for the contest, explained that material submitted by the entrants can be used most effectively in these three ways: 1. As the subjects of publication articles and papers presented before technical meetings. 2. As advertising copy. 3. As ammunition for salesmen.

He suggested that the first use would be best served by including in the contest a category covering broad discussions such as applications for shock resistance, wear resistance, high temperature, etc., with case histories to illustrate the points covered.

In the presentation of contest awards, Joe Jopling, project engineer, Phil H. Edwards Contruction Engineers, Fort Worth, Tex., was announced by Mr. Carmichael as the winner of a $1000 award and a national gold certificate in Class 1, and Donald N. Rosenblatt, chief metallurgist, American Foundry & Machine Co., Salt Lake City, Utah, as the winner of the same awards in Class II.

Class I was open to engineers, designers, and users of steel castings and Class II incorporated employees of steel foundries.

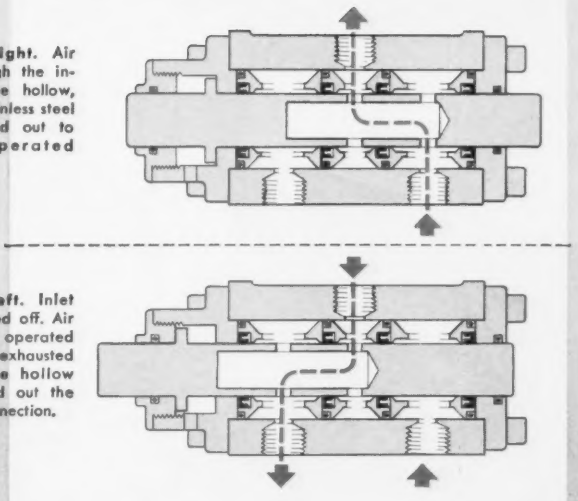
Mr. Jopling's entry was entitled "Composite Weld Construction for Rock Ripper Frame." Other national award winners in Class I included Russell W. Henke, Russ Henke Associates, Elm Grove, Wis., $750 and national silver certificate for his paper entitled "Analytical Design Leads

WHO says all control valves are pretty much alike?

This exclusive patented*

Quick-As-Wink®

construction



Plunger Right. Air flows through the inlet—and the hollow, polished stainless steel plunger—and out to the air operated device.

Plunger Left. Inlet air is blocked off. Air from the air operated device is exhausted through the hollow plunger, and out the exhaust connection.

assures users unparalleled efficiency, economy, dependability and satisfaction

Quick-As-Wink Control Valves are in a class by themselves! Our exclusive patented* valve chamber construction, that accurately positions the "O" rings and the "U" packers without mechanical pressure, meets the most exacting service requirements. No direct flow across the packings, greatly prolonging their life. No lapped joints. No metal to metal seating. Hundreds of different types and actions. Sizes from ¼" to 4". Get full details.

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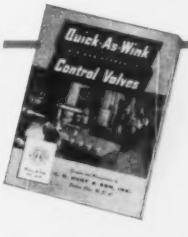

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AIR AND HYDRAULIC
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Circle 633 on Page 51

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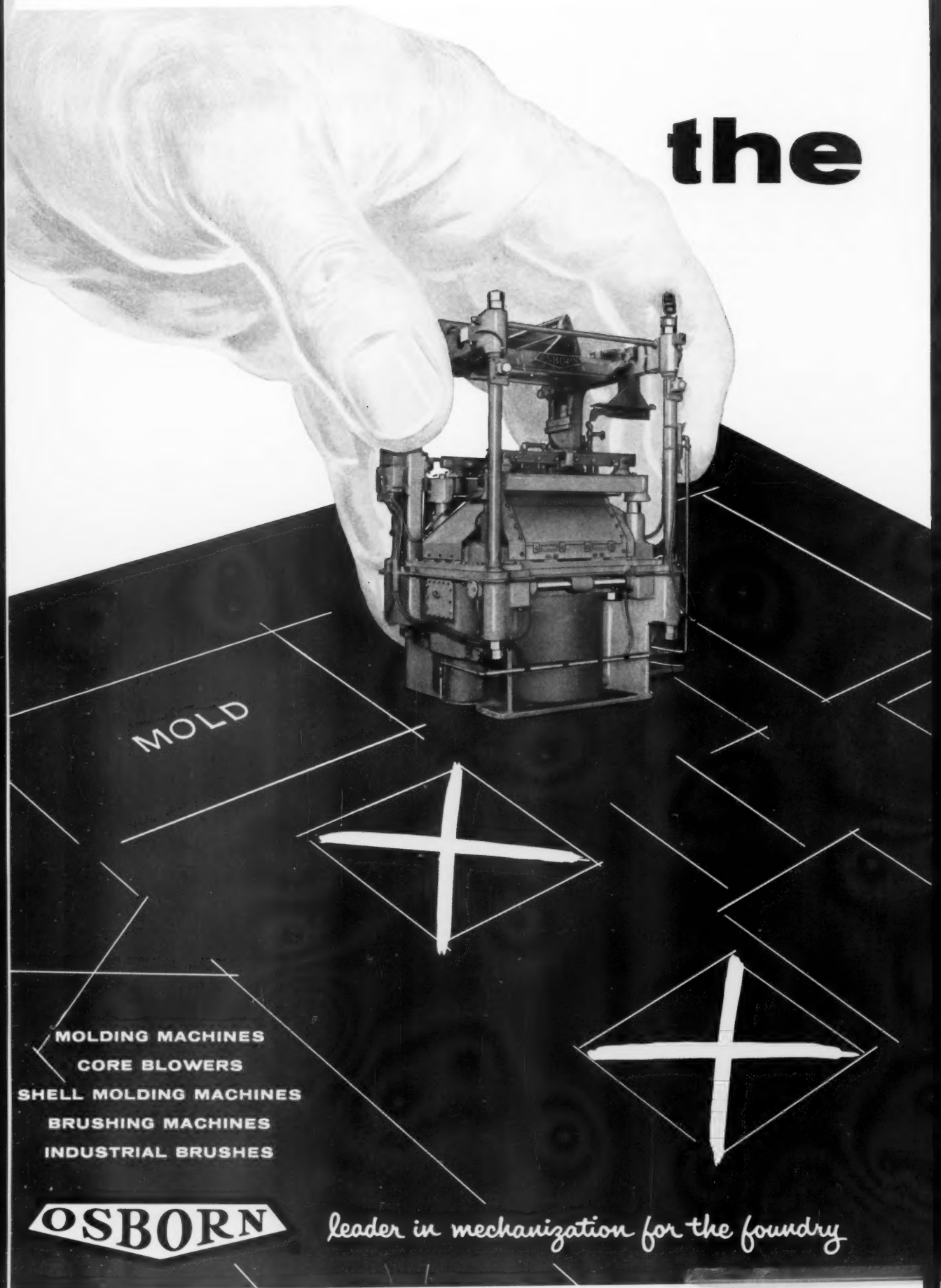

MOLDING MACHINES
CORE BLOWERS
SHELL MOLDING MACHINES
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leader in mechanization for the foundry

right move

starts with an Osborn Methods Study

THE key word in the foundryman's mind today is . . . *costs—lower* costs. There's a *right move* to lower foundry costs. Osborn *knows that move.* It starts with an Osborn Methods Study.

Here's where you can get the full benefit of the foundry industry's most *advanced thinking* . . . the most up-to-date methods and equipment for the production of low cost molds and cores. And the right time is *now* . . . while your foundry plans are still in the "talking stage".

If your mind is on lower costs . . . on speeding production . . . on boosting foundry efficiency—the right move is clear. Call Osborn.

Foundrymen know they can count on an *Osborn bonus* of over 50 years technical and application know-how . . . experience that has led to a complete Osborn line of dependable, efficient foundry production-tested equipment.

Our staff of Foundry Engineers is ready to help you develop the *best setup* for your foundry . . . a setup *designed to lower your costs.*

Without obligation, they will work with you . . . study your molding and core-making needs . . . show you exactly where you can improve your operations. Write for full details. *The Osborn Manufacturing Company, 5401 Hamilton Avenue, Cleveland 14, Ohio.*

COLES: the "big power" in any scrap

Loading furnace-charging boxes, handling flasks or heavy castings,—for all materials handling and maintenance work, COLES is today's most effective, most flexible foundry tool. Self-propelled, truck or rail mounted, COLES may be equipped with tongs, slings, clams or electric magnets for a variety of foundry jobs. COLES pays its way in more ways*—faster.

*None other of equal capacity can claim the overall economy: lowest fuel consumption, lowest maintenance cost. Available L.P.-, diesel- or gasoline-electric powered in capacities from 5 to 50 tons.

COLES

Write for materials handling survey report: "101 Cost-Cutting Ways".

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to Replacement of Weldments with Steel Castings in Compaction Heavyweight"; Robert Eichenberg, chief engineer, McEvoy Co., Houston, $400 and national bronze certificate for his paper entitled "Triple High Pressure Oil Field Valve"; Kenneth E. Jones, chief engineer, Joe Stine Inc., Houston, $200 and national blue certificate for his paper entitled "Castings for Oil Wells at Sea"; and Samuel K. Hodgson, staff engineer, Chance-Vought Aircraft Co., Inc., Dallas, $100 and national steel gray certificate for his paper entitled "Missile Catapult Cart."

Mr. Rosenblatt's paper was entitled "Use of Steel Castings in Mining Equipment." Other national award winners in Class II included American Steel Foundries, East Chicago, Ind., $750 and national silver certificate for a paper entitled "Wearpact Dipper Points for Power Shovel"; L. W. Songer and E. S. Frens, General Electric Co., Schenectady, N. Y., $400 and national bronze certificate for their paper entitled "Conversion from Forged to Cast Nozzle Boxes"; Robert H. McAllister, Los Angeles, $200 and national blue certificate for his paper covering cast steel "Lift-Slab Collars"; and Lawrence S. Krueger and Clarence Ancher, Pelton Steel Casting Co., Milwaukee, $100 and national steel gray certificate for their paper entitled "3.6 Pounds Equal $140,000 of Steel Casting Business."

In addition, divisional awards in Class II of $100 and gold certificate; $50 and silver certificate; and $25 and bronze certificate were made in each of the eight geographical divisions of the society.

Certificates were also awarded in both Class I and Class II for each of the following subjects: Functional analysis, engineering a steel casting, redesign of a steel casting, conversion to a steel casting, cast-weld, composite-weld, close-tolerance steel castings, improved steel castings performance, treatment of a steel casting, manufacturing operations, administrative factors, inspection, steel castings in use.

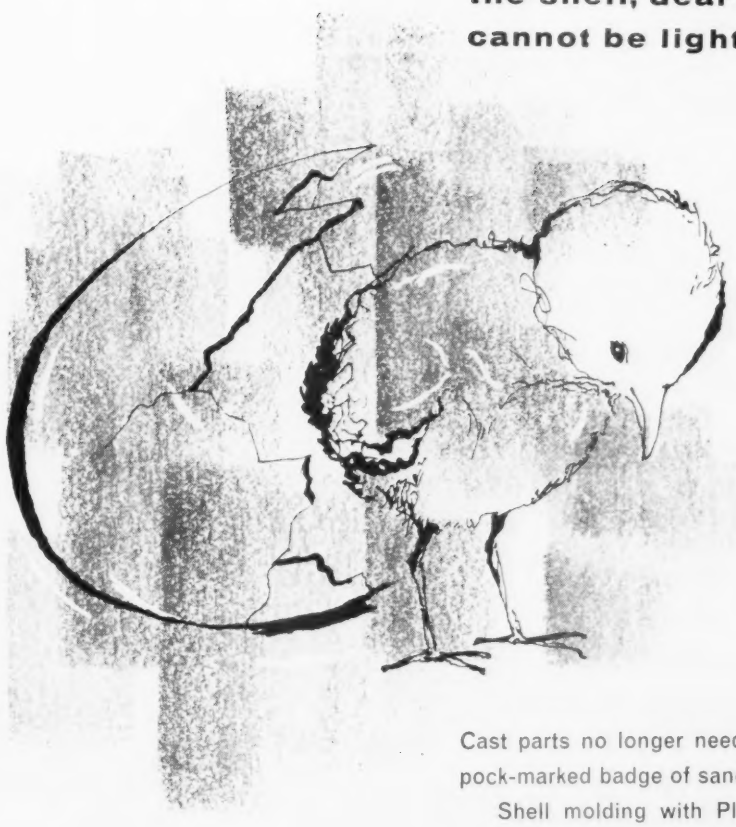
Sees Steady Trend—Business activity the next 12 months is more likely to move sidewise than to rise or fall markedly. This prediction was made by James M. Dawson, vice president and economist, National City Bank of Cleveland. He expects gross national product to be sustained by consumer spending. Shortage of labor tends to push up personal income which, in turn, will swell personal spending and offset such factors as the cut in defense expenditures and the disappearance of the recent stimulus of inventory appreciation.

Opening the second day's meeting

Circle 635 on Page 51

PLENCO SHELL MOLDING RESINS

the shell, dear friend, cannot be lightly dismissed

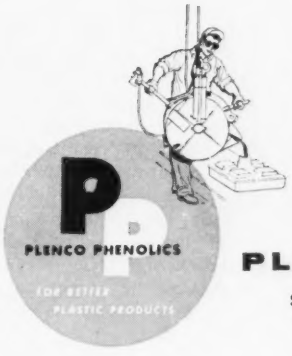


Cast parts no longer need emerge wearing the pock-marked badge of sand casting.

Shell molding with Plenco phenolic resins has made that rough-hewn appearance obsolete. Now, parts can be cast with smooth surfaces that require little or no polishing. And machining required is negligible, or often even completely unnecessary.

Plenco phenolic shell molding resins form light, dimensionally accurate molds. They are adaptable for most metals, even hard-to-cast ductile iron. And the molds are extremely durable.

The savings in time and money are easily apparent. Apply these economies to your production. Consult with Plenco about **your** product or product-problem.



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Sheboygan, Wisconsin

Serving the plastics industry in the manufacture of high grade phenolic molding compounds, industrial resins and coating resins.

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HIGH PURITY FOUNDRY ALLOYS

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"Supermarket"

Yes, a whole new section is added to our Foundry Alloy "Supermarket" ... High Purity Alloys by Shieldalloy are now in our warehouses to give you quickest availability and widest selection all from one source.

*Shieldalloy High Purity Foundry Alloys include.

Chromium Metal "99"
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Our foundry engineers will be happy to give you the latest information on Shieldalloy, and our other foundry alloys – Nickel, Ductile Iron Additives, Iron Foundry Inoculants, Vanadium, Chromium, Silicon, Manganese. Why not call today?

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was presentation of a new motion picture, "Photoelastic Studies of Joined Sections in Steel Castings and Weldments." This film, part of the society's research project No. 19, "Studies of Design Factors as Related to Methods of Manufacture," is concerned with the effect of various corner designs on stress distribution and fatigue failure. The film commentary is by Charles W. Briggs, technical and research director.

Two new honorary members have been elected to the society, it was announced by President Park. They

E. C. Huebner, chairman, SFSA Safety Committee, speaking at the society's fall meeting

are Marshall Post, retired vice president, Birdsboro Steel Foundry & Machine Co., Birdsboro, Pa., and Claude L. Harrell, formerly president, secretary-treasurer, and sales manager, Sterling Steel Casting Co., East St. Louis, Ill.

Chauncey Belknap of Patterson, Belknap & Webb, New York, discussed terms and conditions of sale incorporated in order and acceptance forms, and pointed out pitfalls which may be encountered through the wording in certain forms.

The growing extent to which government-operated plants are competing with private enterprise, and the increase in number and size of tax-exempt organizations, were emphasized by Joseph F. Leopold, Dallas, in a talk on "Your Competitor—Uncle Sam."

Safety Awards—The meeting was closed with the presentation of awards

Another First

560 MILES UP
18000 MILES PER HOUR

While the satellite radiates "Beep-Beep!", the first call from outer space, we respectfully call your attention to **ALLOY METAL ABRASIVE COMPANY'S** 4 firsts in cast steel abrasives:

1. **FIRST PRODUCER**
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ORIGINATORS OF CAST STEEL SHOT

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Known By The Company We Keep
As sales representatives for America's leading producers of quality foundry commodities, we are especially proud of our association with The Woodward Iron Company, the nation's largest independent producer of highest quality foundry and malleable pig iron since 1882.
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WOODWARD IRON COMPANY
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Established 1890

in the annual SFSA safety contest by President Park and E. C. Huebner, chairman of the society's Safety Committee and personnel manager, Wehr Steel Co., Milwaukee. Mr. Huebner said that the rising trend in accidents in steel foundries during 1955 and 1956 has been arrested this year; the frequency rate through July was 19.7, against 21.7 for all of 1956, and was down to 16.5 for July itself.

Mr. Huebner emphasized that the future trend will depend on the attitude of top management, not on the efforts of the safety director alone. His committee is working to cut accidents in material handling.

The society's 1957 safety contest, conducted during June, July, and August, was participated in by 132 foundries. They had 415 accidents during 25,734,000 manhours of work for a frequency rate of 16.1. Highest honor awards went to 24 plants with no lost-time accidents during the three months. Certificate awards for accident frequency rates of less than 10 went to 31 plants. The winners follow:

HIGHEST HONOR AWARDS

(Group No. 1, 1 to 25 Thousand Manhours)

Worthington Corp., Harrison, N. J.; General Railway Signal Co., Rochester, N. Y.; Westlectric Castings, Inc., Los Angeles; Tonawanda Electric Steel Casting Corp., North Tonawanda, N. Y.; U. S. Foundries Inc., Denver; Vulcan Steel Foundry Co., Oakland, Calif.; Pacific Car & Foundry Co., Renton, Wash.; Youngstown Alloy Casting Corp., Youngstown, Ohio; Thys Co., Sacramento, Calif.; Eastern Malleable Iron Co., Wilmington, Del.; Calumet Steel Castings Corp., Hammond, Ind.; Texas Foundries Inc., Lufkin, Tex.; Alloy Cast Steel Co., Marion, Ohio.

(Group No. 2, 26 to 50 Thousand Manhours)

East Texas Steel Castings Co., Longview, Tex.; Atlas Foundry & Machine Co., Tacoma, Wash.; Kay-Brunner Steel Products Inc., Alhambra, Calif.; Chapman Valve Mfg. Co., Indian Orchard, Mass.; Hartford Electric Steel Corp., Hartford, Conn.; Florida Machine & Foundry Co., Jacksonville, Fla.; Walworth Co., Greensburg, Pa.

(Group No. 3, 51 to 90 Thousand Manhours)

United States Steel Corp., Johnstown, Pa.; Sawbrook Steel Castings Co., Lockland, Cincinnati, Ohio; Mackintosh-Hemphill Div., Midland, Pa.

(Group No. 4, 91,000 and Up Manhours)

Foundry & Mill Machinery Div., Blaw-Knox Co., Coraopolis, Pa.

CERTIFICATE AWARDS

(Frequency rates as indicated)

Pittsburgh Steel Foundry Corp., Glassport, Pa. (2.0); American Steel Foundries, Granite City, Ill. (2.0); National Malleable & Steel Castings Co., Sharon, Pa. (2.2); Ohio Steel Foundry Co., Lima, Ohio (2.6); Foundry & Mill Machinery Div., Blaw-Knox Co., East Chicago, Ind. (2.6); American Steel Foundries, Alliance, Ohio (2.6); Foundry & Mill Machinery Div., Blaw-Knox Co., Wheeling, W. Va. (2.8); Maynard Electric Steel Casting Co., Milwaukee (3.6); Oklahoma Steel Castings Co., Tulsa, Okla. (3.9); United Engineering & Foundry Co., Vandergrift, Pa. (3.9); Superior Steel & Malleable Castings Co., Benton Harbor, Mich. (4.9); General Steel Castings Corp., Eddystone, Pa. (5.1); General Steel Castings Corp., Granite City, Ill. (5.4); Penn Steel Castings Co., Chester, Pa. (5.5); Ross-Meehan Foundries, Chattanooga, Tenn. (5.5); Dominion Foundries & Steel Ltd., Hamilton, Ontario (5.5); Gunite Foundries Corp., Rockford, Ill. (5.7); Atlantic Foundry Co., Akron (6.1); Cooper Alloy Corp., Hillside, N. J. (6.1); Canadian Steel Foundries (1956) Ltd., Montreal, Quebec (6.4); Duriron Company Inc., Dayton, Ohio (6.6); Electric Steel Foundry Co., Portland, Oreg. (6.6); Crucible Steel Company of America, Harrison, N. J. (6.7); American Hoist & Derrick Co., St. Paul (6.9); American Steel Foundries, East Chicago, Ind. (7.4); National Malleable & Steel Castings Co., Melrose Park, Ill. (7.8); Lebanon Steel Foundry, Lebanon, Pa. (7.9); Wehr Steel Co., Milwaukee (8.3); Birdsboro Steel Foundry & Machine Co., Birdsboro, Pa. (8.5); Crucible Steel Casting Co., Cleveland (9.0); Minneapolis Electric Steel Castings Co., Minneapolis (9.3).

FOR QUALITY THAT STANDS CLOSE INSPECTION

Men averaging more than 16 years of pattern-making experience mill patterns for high-production castings at Pyle. This combination of first-class equipment in the hands of veteran craftsmen has built and maintained the Pyle reputation for more than fifty years of superior patterns.

. . . we suggest you look to Pyle! Our business has been built serving customers who accept nothing less than perfection.

Here every wooden model is prepared in flawless detail by men averaging 19 years of patternmaking experience. Our integrated foundry is designed, equipped and operated exclusively for pattern production. We have the lathes, radial drills, milling machines, planers and hydraulic or automatic duplicators to meet your every need. Meticulous hand finishing and uncompromising inspection guarantee your complete satisfaction.

For fifty years we've made patterns for America's most quality-conscious firms. May we have the pleasure of making them for you?

PYLE

PATTERN AND MANUFACTURING COMPANY

Muskegon Heights, Michigan

Circle 640 on Page 51

BORON STEEL SPROCKETS . . .

Resist Wear in Tractor Service

Sprocket inspection includes a careful check of tolerances. More than 20,000 have been produced

BORON-CONTAINING steel castings are being used to measurably increase the life of crawler tractor sprockets. Marketed under the tradename Boralloy, these sprockets are now standard equipment on two models of Caterpillar Tractor Co. tractors.

Representing the first commercially successful attempt to produce boron-bearing cast carbon steel by the acid open-hearth process, the Boralloy sprocket was developed as a co-operative research project of the company and Harrison Steel Castings Co., Attica, Ind.

The ability of boron to produce hardenability in steel has been recognized for many years; at the same time, boron additives have virtually no effect on the other properties of steel. Experiments with boron steels were conducted as far back as 1890, and in 1924 the first patent was granted for a process to increase hardenability through boron addition.

When World War II forced an intensive search for substitutes to supplement the dwindling supply of critical alloys, boron was one of the first substances to receive extensive examination.

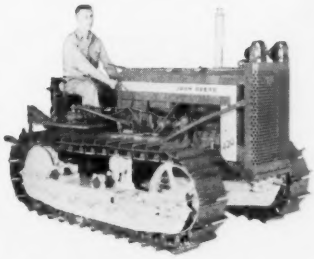
Under the direction of the SAE Engineering Board, Caterpillar Tractor Co. began its first large-scale operations with boron steel. This project was the brainchild of two men—G. C. Riegel, former Caterpillar chief metallurgist, now retired, and Norman Tisdale, presently vice president of Molybdenum Corp. of America.

As a direct result of these tests, several types of boron steels proved to be suitable alternates for many conventional steels of higher alloy content. By 1945, considerable boron steel had been used in the manufac-

Boron addition results in a deep, even hardness, as shown in section

Harrison Steel Castings Co. charging floor. Shown (l-r) are G. C. Dickey, Harrison works manager; J. R. Sloan, Caterpillar metallurgist; G. L. Harrison, vice president, and B. A. Lawson, chief metallurgist, of Harrison

what about shell core **size**?



9" x 4½" x 20" shell core is used in casting the crankcase for John Deere power-unit engine cylinder blocks. Cores for final drive housings of Deere tractors such as this crawler type in the "420" series are also produced by the shell method.

John Deere makes them **big** with **DUREZ RESINS**

All kinds of factors are in your favor when you turn to large cores produced by the shell method with Durez bonding resin.

As size increases, the time, labor, and material savings observed in producing small shell cores become more remarkable. Production in one piece eliminates extra handling. *This Durez resin-bonded core* replaces cores made in three pieces, which had to be fitted one by one into green sand molds. Durez bonded cores have great dimensional stability and let you meet tolerances impossible to get with green sand cores. The need for core driers is eliminated, too.

Shells and cores made with Durez resin coated sand —blown or dumped— exhibit a uniform structure with no segregation. Less resin is required to provide given hot and cold strengths. Fast build-up, freedom from peel-back or fall-off, and the clean shake-out assured by the resin contribute to smoother flow of production.

If you are looking for higher metal yield with fewer man-hours per ton, decide now to investigate the advantages of shell molding with Durez resins.

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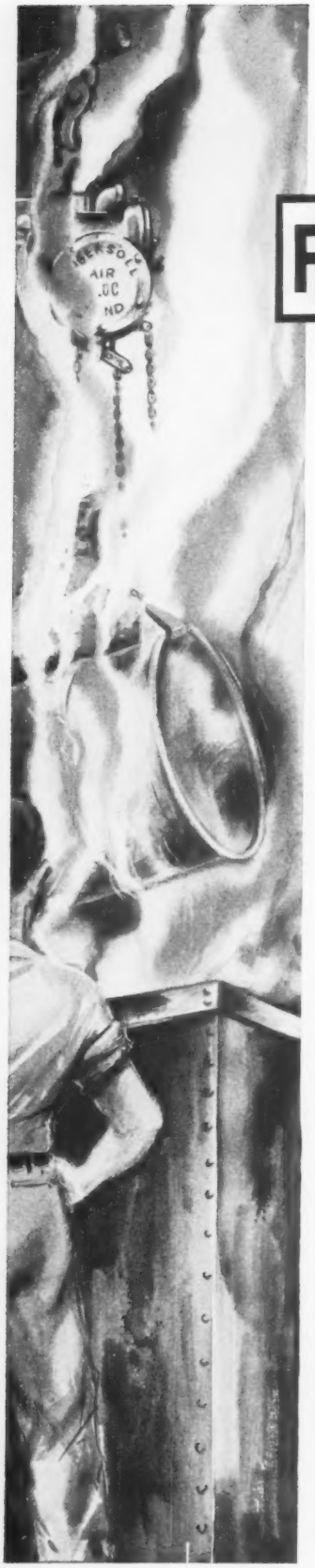

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ture of tractor parts and other war material. In some cases, the addition of boron permitted critical alloys to be reduced as much as 75 per cent of the former required amounts.

When the Korean conflict again brought tight control of critical alloys, steelmakers took another look at the possibilities of boron. One development during this period was the use of boron in cast steel armor for tanks and tank transmission cases. Boron-containing armor plate could be heat treated to a considerable depth without using large amounts of critical alloys. Foundries later adopted this process to fortify medium-alloy steel in high-wearing, heavy-section parts. Boron had found its first wide usage in heavy steel castings.

Needed Long-Lived Sprocket

In 1955, increased weight and horsepower in two Caterpillar tractor models brought about the need for a long-lived sprocket which would defy continual punishment. Early that year, Caterpillar metallurgists began discussing with Harrison Steel Castings Co. the possibility of increasing the depth of hardness of sprocket wearing surfaces. The Harrison foundry has been a major supplier of steel castings to Caterpillar and its predecessors for more than 42 years.

As the talks progressed it was decided that boron or molybdenum might achieve the desired hardenability. Although Caterpillar had considerable experience with boron steels (consumption since 1951 exceeded 50,000 tons), very little could be predicted about its reaction in cast carbon steel. Molybdenum did offer somewhat better possibilities but the project metallurgists decided to try boron first.

Up to 1955 boron had been added to steel almost entirely by the basic electric furnace process. Although Harrison has electric furnaces, the decision was made to try the experimental heats in the acid open-hearth furnace.

On Dec. 13, 1955, the first experimental heat was made, and preliminary results were encouraging. Tests made from samples of the first boron steel heat indicated a hardness depth 2½ times greater than that of straight carbon steel of the same chemistry. Tests were also made at the Caterpillar metallurgical laboratory in Peoria to confirm these results.

Seven heats of 25 tons each were made to determine the exact melting practice. From these heats the correct amounts of boron addition, de-

Circle 642 on Page 51

oxidation practice, yield, and the best method of working each heat were developed. The amount of boron compounds added to each heat is less than 0.005 per cent of the steel's total composition.

After some initial development it was decided to stop further work with other elements. Ralph Sloan, Caterpillar metallurgist who actively collaborated with Harrison throughout the project, commented, "During the experimentation period, two heats containing conventional alloys were made. We found, however, that the boron-bearing steel was so promising that other approaches to the problem were abandoned. The conventional alloys proved unsatisfactory because the sprockets developed cracking problems during the heat-treating process and failed to produce the desired increase in hardenability."

Following confirmation of these tests, patterns of the sprockets were changed to provide enough metal section to utilize effectively the depth of hardness developed in the boron steel during conventional heat treatment.

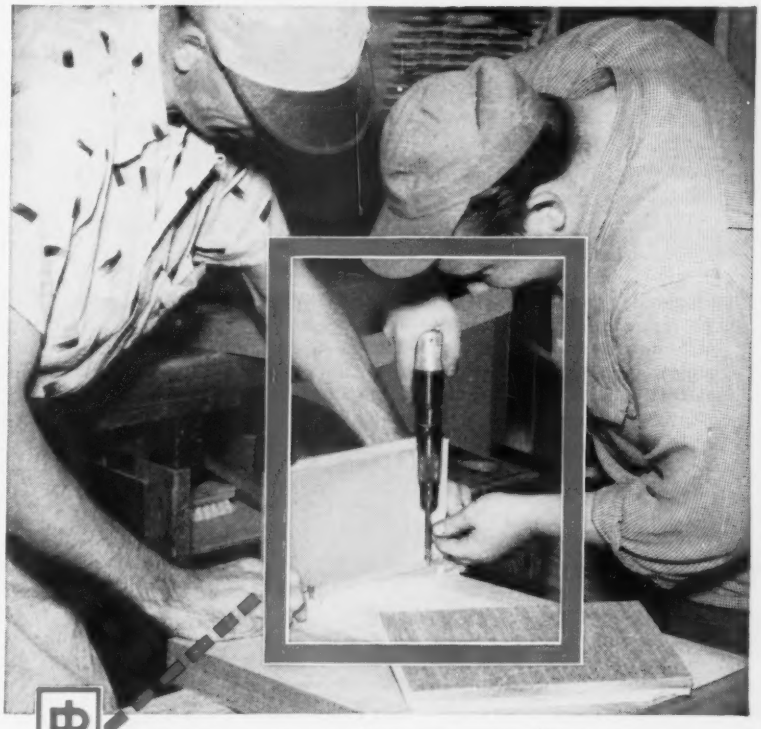
After design changes had been made and preliminary results carefully checked through laboratory and field tests, regular production began in October, 1956. Since that time more than 20,000 of the harder sprocket castings have been poured from boron steel.

AFS Apprentice Achievement Contest Is Announced

Regulations for the 1958 Robert Kennedy Memorial Apprentice Achievement Contest have been announced. This annual competition, designed to stimulate interest in apprentice training, recognize craftsmanship, and reward individual achievement, opened Oct. 1, 1957, and closes April 7, 1958. All qualifying castings and patterns for national judging must be received by R. W. Schroeder, University of Illinois, Chicago, before 5 p.m. on date of closing.

Contests are open to any apprentice or trainee in the metal castings industry with not more than five years of pattern experience and not more than four years of experience in molding. Students of trade, vocational, or high schools are eligible to enter the contests at discretion of local AFS chapters. Full information is available to interested companies and apprentices on request to the AFS Education Director, Golf & Wolf Roads, Des Plaines, Ill.

is there a COST-SAVING idea in this picture for you?



air-powered screw drivers end handwork in close quarters

*Exceptionally small side-to-center distance of this Ingersoll-Rand air-powered screw driver permits running screws that electric tools can't reach and that formerly had to be driven by hand.

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Michigan Regional Foundry Conference Committee members included, left to right: J. D. Jackson, Michigan State University; George T. Babler, Aristo Corp.; Douglas J. Strong, Foundry Materials Co.; Prof. C. C. Sigerfoos, MSU; Richard B. Kropf, International Nickel Co., conference chairman; William C. Truckenmiller, Albion Malleable Iron Co.; Henry A. LaForet, Pontiac Motor Division, GMC; Joseph L. Orloff, Central Foundry Division, GMC; Robert Dodge, Archer-Daniels-Midland Co.; and Dr. Austen J. Smith, MSU. Several members of the committee were not present at the time the picture was taken

Michigan Conference Discusses

NEW PROCESSES

By EDWIN BREMER
Metallurgical Editor

DISCUSSIONS of the newer casting processes drew an attendance of 359 at the Michigan Regional Foundry Conference held Oct. 3-4 at Michigan State University, East Lansing, Mich. Nearly one-third of those attending were students from colleges and universities in the surrounding area.

The conference was sponsored by the university and the Central Michigan, Detroit, Saginaw Valley, and Western Michigan chapters of AFS as well as student chapters of University of Michigan and Michigan State University.

In addition to five technical sessions, two luncheons and two dinners were held. The conference was opened by Richard B. Kropf, International Nickel Co. Inc., Detroit, conference chairman. He introduced Dr. John D. Ryder, dean of engineering, Michigan State, who welcomed those in attendance. Technical chairman W. C. Truckenmiller, Albion Malleable Iron Co., Albion, Mich., presided at the first technical session on cores.

Co_2 Cores for White Iron Castings, by Clarence W. Meyer, Central Foundry Division, General Motors Corp., Saginaw, Mich., indicated that in the author's foundry a bank sand with an AFS grain fineness of 57 to 65 with the minimum silicate binder gives the best results. While finer grain sand gives a smoother surface, more binder is required, and collapsibility is not as good as with coarser sand. Sand mixing should be conducted between 70 and 80°F since cold sand results in unsatisfactory coating and

Talking things over before the opening session are Prof. C. C. Sigerfoos, MSU; Conference Chairman Richard B. Kropf, International Nickel Co.; Chester V. Nass, Beardsley & Piper Div., Pettibone Mulliken Corp., FEF president; and Harry W. Dietert, Harry W. Dietert Co., AFS president

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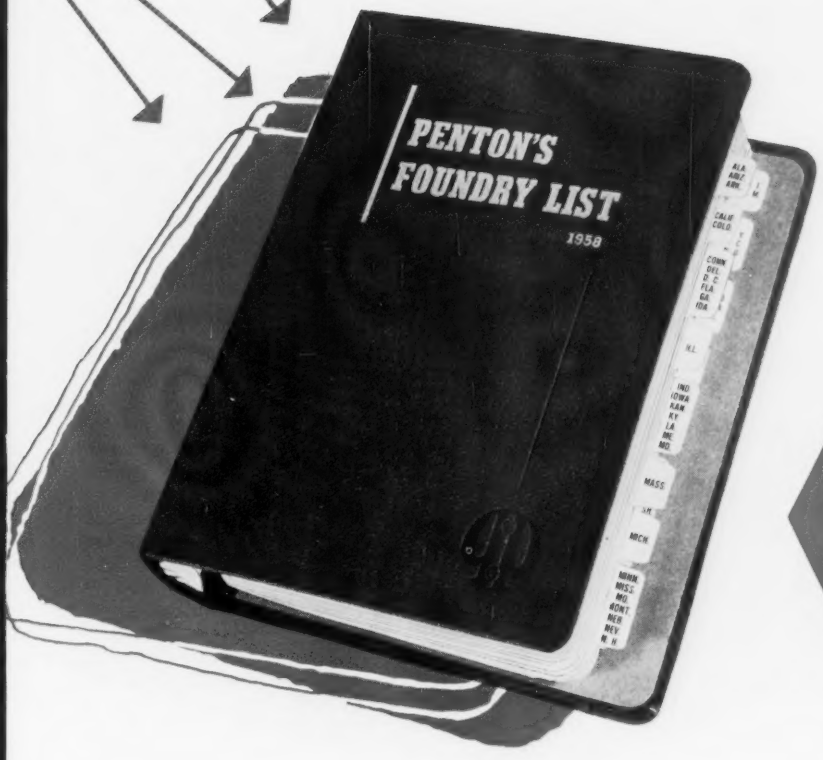

Who? Where?

Metals Melted?

Melting Equipment & Capacity?

Departments Operated?*

Casting Methods?*

(*) The new, 1958 PFL will include these added features for the first time: **a complete list of companies doing die casting and an indication of foundries with heat treating and radiography departments.**

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The 1958 Edition of PFL is now available. It gives comprehensive information on more than 6,300 metal casting plants in the U. S. and Canada. It tells who they are and where they are located; what metals they melt, their melting equipment capacities, and departments operated.

Well-indexed, and in loose-leaf form, PFL is indispensable to casting buyers and foundry suppliers. For prompt delivery, write: Book Department, FOUNDRY, 1213 West Third St., Cleveland 13, Ohio.

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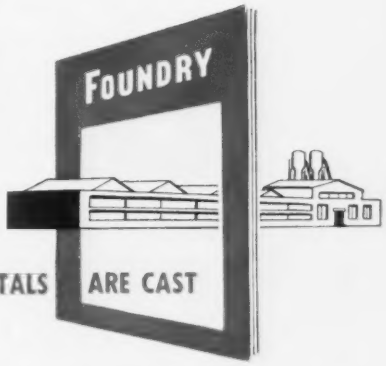

Helping You Sell To Foundrymen

WHEREVER METALS ARE CAST

A PENTON PUBLICATION, PENTON BUILDING, CLEVELAND 13, OHIO

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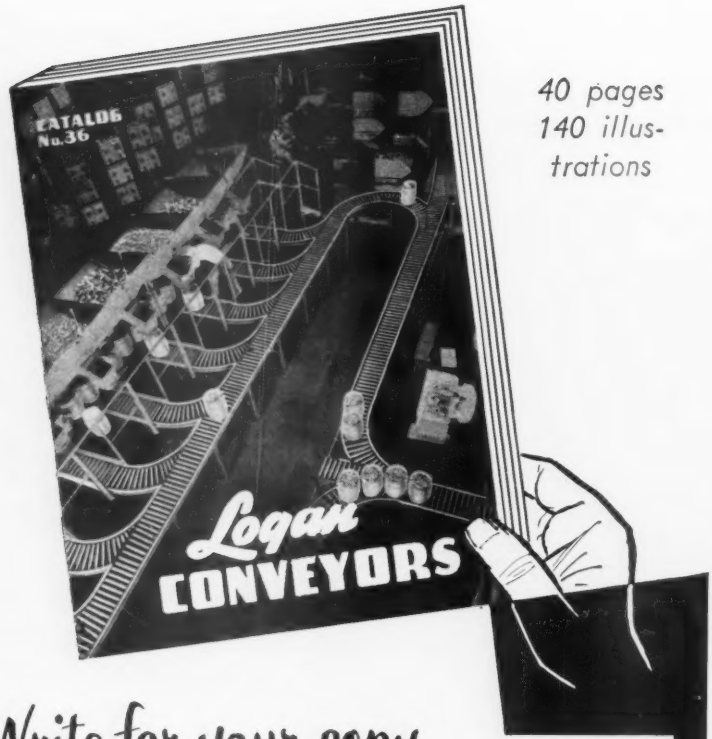

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hot sand causes loss of moisture and weaker cores.

Several additives were tried; collapsibility was best with a 0.5 per cent addition. Higher amounts tended to dry the mix and also required more binder. Spent CO_2 sand had no ill effects on molding sand. It was found that the cured tensile strength of cores (25 to 32 psi) does not have to be high as long as handling properties and collapsibility are sufficient. Degree of collapsibility can be controlled by the amount of binder, additives, and sand grain fineness. Fines and clay in the sand should be kept to a minimum.

Core Shooting, by Robert Rowland, Dock Foundry Co., Three Rivers, Mich., pertained primarily to a description of the operating principle and construction of one machine. Advantages of the equipment include savings in corebox repair, permitting use of wood coreboxes, quick changeover, less maintenance due to fewer moving parts in the machine, and fewer vents in the corebox.

Pinch-hitting for a speaker unable to be present, O. J. Meyers, Reichhold Chemicals Inc., White Plains, N. Y., briefed the audience on two recent developments pertaining to the CO_2 process. One related to use of dry compressed air or nitrogen as the hardening agent instead of CO_2, and the other to application of alternate vacuum and pressure-gassing cycles in the process. Dry compressed air or dry nitrogen gives suitable hardening and properties in small cores, but drying of the silicate bond in larger cores is too slow. For large cores the most efficient procedure appears to be gassing for a short period with CO_2 to produce enough set for handling and then allowing moisture loss in the atmosphere to accomplish the necessary strength.

Application of alternate cycles of vacuum and pressure gassing with CO_2 is reported to reduce CO_2 consumption to one-third to one-fourth of that used in conventional practice. Edges and corners in deep, blind pockets are hardened. Cured cores are uniformly hard. Vents are not required in boxes. The procedure employs a box or chamber, and cores can be cured in the corebox or on driers after stripping. A chamber full of cores can be cured with the same vacuum unit cycle time as with individual cores. When sufficient cores are not available to fill the chamber, wood blankoff blocks are used to occupy the excess space.

Afternoon session was devoted to preventive maintenance. M. L. Williamson, Chevrolet Gray Iron Division, GMC, Saginaw, Mich., dealt with **Air.** He suggested that inspection of air

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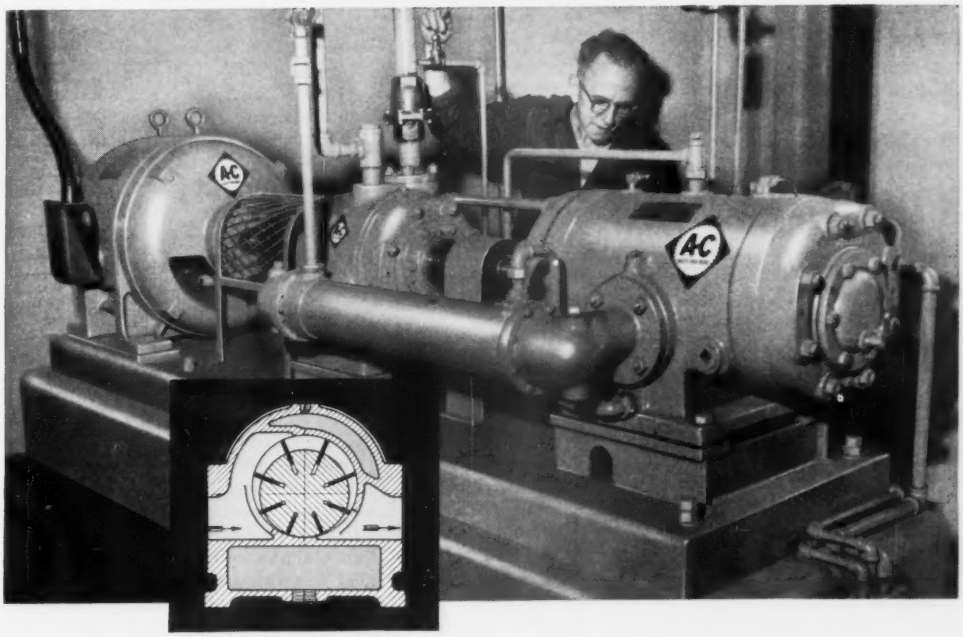

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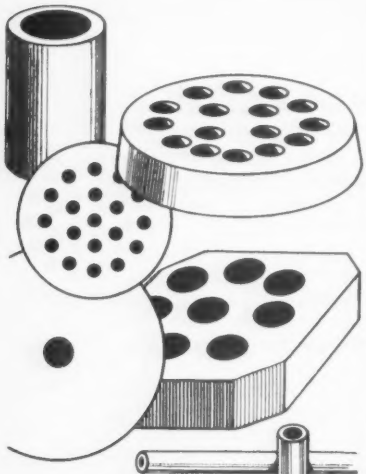

DU-CO CERAMICS CO. Butler 10, Penna.

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compressors by operators and maintenance personnel include half-hour checks of oil lubricators and air and water temperatures; hourly checks of governor oil level, crankcase oil level, condensate traps including inter and after coolers, and all packing and gaskets for leaks; daily checks on oil filters, and for loose nuts and bolts; weekly checks for piping leaks, and tests of safety valves; monthly checks of bearing clearances, and of intake and discharge valves. Every 1000 hours of operation crankcase oil should be changed and alignment of crosshead and pistons checked. Inter and after coolers should be cleaned every 6 months.

James Stewart, Chrysler Corp., Detroit, discussing **Belting,** pointed out that conveyor belts have to withstand hard usage in the foundry. Heat-resistant quality should be such as to minimize burning by hot sand and castings. Sometimes burning is caused by friction resulting from slippage; it can be overcome by lagging the drive pulley with rubber. Puncturing and ripping of belts by tramp iron can be decreased by use of skirt boards along the edges and by magnetic pulleys which remove the material. Belt misalignment and frozen idlers tend to cause ripping.

Bearings were considered by E. J. More, Detroit Ball Bearing Co., Grand Rapids, Mich. He recommended in-plant training of maintenance personnel on bearing theory and practice for better understanding of their care. He also suggested that blueprints and drawings of equipment containing information on bearings used be obtained so that proper maintenance is followed, and in case of repair that the correct type of bearing is used. Additionally he proposed keeping of accurate records on inspection, repair, etc.

Electrical Control Equipment, according to R. Belting, Albion Malleable Iron Co., Albion, Mich., should be accessible for inspection and repair. Initial planning prior to installation of control panels, relays, and switches can protect them from the vibration, dust and dirt, oil, and heat. Vibration causes chafing of wires and short circuits. It also results in malfunctioning of relays and switches. Dust and dirt foul contacts on switches and relays, but such trouble may be minimized by enclosing the units in polyethylene plastic bags such as used for food protection. Instrument panels should be isolated from hot locations.

Second morning's session opened with a discussion on **Gamma Radiography** by D. M. Murray, Albion Malleable Iron Co., who pointed out that application has to be made to the Atomic Energy Commission to secure the isotope to be used. The commission also supplies regulations on safety. The speaker described the various terms applied to measuring gamma radiation, exposure meters worn by operators of gamma-ray equipment. He indicated that safe operation primarily is based on length of time of exposure, distance between operator and gamma ray source, and shielding.

Mr. Murray also gave information on properties of the three commonly used isotopes for gamma radiography. Cobalt (Co^{60}) has a half life of about 5.27 years and will penetrate 1 to 6 in. of steel. Iridium (Ir^{192}) has a half life of 74.4 days and will penetrate ¼ to 2½ in. of steel. Cesium (Ce^{137}) has a half life of 26.6 years and will penetrate ½ to 3 in. of steel.

Quality control and scrap reduction were discussed by two speakers. **Nonferrous** by Robert Cope, Rapid Cast Corp., Grand Rapids, Mich., pointed out that quality control essentially may be divided into factors of appearance, dimensional tolerances, and physical properties. These factors will vary according to the customer's requirements. To meet the requirements the chief inspector must have complete information on what they are. In permanent mold operation numerous factors have a bearing on the casting produced, such as metal and mold temperatures, wear of equipment, mold coating, cycling, etc.

Dimensional Control of Steel Castings, by W. T. Shute, West Michigan Steel Foundry Co., Muskegon, Mich., listed 13 causes for deviations from anticipated dimensions. They include ambiguities in the drawing; inaccurate patterns; later distortion or wear of patterns; variations in sand composition, cooling contraction, sand ramming, mold and core handling, pouring temperature, metal composition, time before shakeout, and shakeout handling; uneven cooling after shakeout, and uneven heating and cooling during heat treatment and welding.

Cures for most of these variables are obvious and are limited only by practical considerations. Experience is valuable in anticipating correctly the amount of hindrance to contraction inherent in the design of any casting. Occasionally sand movement on jolt machines, slingers, and blowers causes trouble. In rangy castings variations of 1/16 in. per ft can be caused by time of shakeout. Uneven cooling at shakeout or later may result in distortion. Any measurable dimensional tolerance on production castings can be obtained by one means or another, and it essentially is a matter of cost.

Afternoon session was devoted to

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Shell Molding Developments at Ford Motor Co., by Harold C. Grant, Dearborn Specialty Foundry, Ford Motor Co., Dearborn, Mich., which described production of nodular iron crankshafts, alloy iron camshafts, alloy steel automotive valves, and some gray iron castings in several different foundries operated by the company.

Shell molds are produced by several different methods—the dump, strike-off, and blow. In the strike-off method for obtaining flat surfaces a measured amount of sand is dumped on the pattern, which is not surrounded by a flask. A strike-off bar, placed at a height to give the desired thickness, is moved across to remove excess sand. Elimination of the flask prevents heat pickup by the strike-off bar and provides a smooth surface. A hot bar results in sand pickup and rough surface.

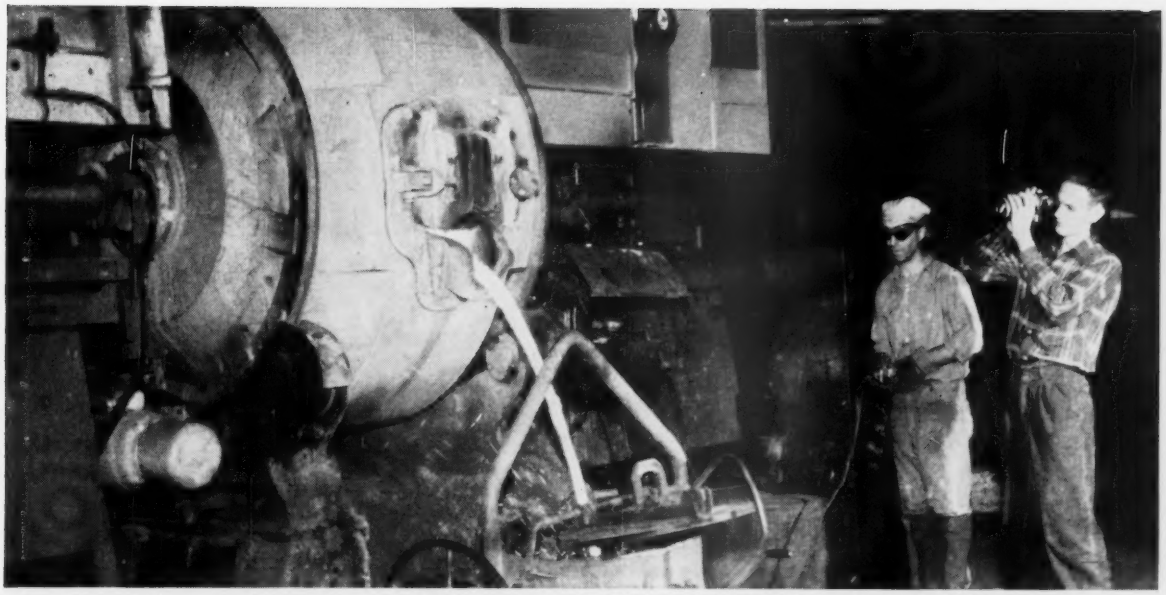
The blow method employs resin-coated sand, which is blown into contoured boxes to form shells of uniform thickness following the contour of the pattern. Cured shells are placed in cast iron, contoured backing plates for pouring. Essentially the procedure might be considered a permanent mold process employing a sand lining in the mold.

Following the formal presentation, the speaker, assisted by Ralph W. Gardner and Walter Blyler, Dearborn Iron Foundry, and Arthur Adams and George Beals, Dearborn Specialty Foundry, answered questions. It was brought out that choice of sand-resin combination and shell molding method depends on the type of casting. A clay-free, three-screen sand of 90 to 100AFS grain size was found to be satisfactory. Dry sand-resin mixes as well as resin- coated sands are used. Tensile test specimens of the sand are employed as controls.

Cost Reduction Workshop Is Scheduled in Kansas City

A Cost Reduction Workshop will be conducted by Phil Carroll, nationally known consultant, on Nov. 15 at the Elk's Club, 19 East Armour, Kansas City, Kans. The workshop is the 1957 version of the Heart of America Industrial Engineering Conference. The fifth annual event of its type, it is cosponsored by the Kansas City Chapter, Society for the Advancement of Management, and the University of Kansas Extension Center.

Topics to be covered include Planning Budgets To Reduce Costs, Finding and Plugging Profit Leaks, and How Supervisory Personnel Can Cut Costs. Featured on the conference



A heat of alloy iron being poured from a 1500-lb. capacity Type AAH Detroit Electric Furnace in the Westinghouse foundry.

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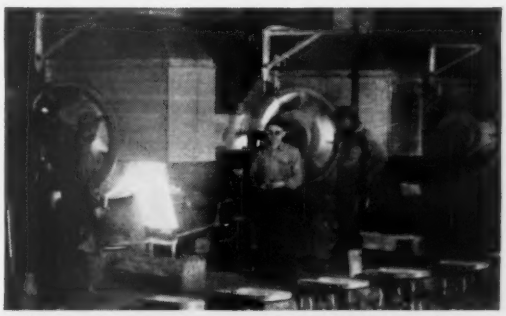
Send us your operating data and our engineers will show you how Detroit Electric Furnaces can best meet your melting requirements.



A battery of six 750-lb. capacity LFYH Detroit furnaces melt bronze of more than a dozen specifications.

A Westinghouse man records a heat of ductile iron melted in Type AAP Detroit Furnace with motorized electrodes.

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Circle 651 on Page 51

USING TOO MUCH COKE?

Why not talk this over with one of our metallurgists with a view to taking advantage of the superior quality of Semet-Solvay Foundry Coke in reducing your melting costs.

SEMET-SOLVAY DIVISION
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For Better Melting

Circle 652 on Page 51

program is a dinner session at which Mr. Carroll will speak on "Selling Your Ideas."

Cost is $15 for members of the Society for the Advancement of Management and $20 for nonmembers. For additional information, contact Mr. E. S. Avison, University of Kansas Extension Center, 39th & Rainbow Blvd., Kansas City 12, Kans.

NFA Announces Program for New York Annual Meeting

Program for the annual meeting of the National Foundry Association will be highlighted by staged skits portraying the steps employed by a fictional foundry in preparing for labor negotiations and the strategy used. The cast will include six men from industry.

The association's two-day meeting will be held at the Waldorf-Astoria Hotel, New York, Nov. 7-8.

Among other topics to be discussed are objectives and goals of major foundry unions and the development of good employee communications.

Program details follow:

Thursday, Nov. 7

9 a.m.—Report of the president.

9:30 a.m.—**Immediate Objectives and Long-Range Goals of the Major Foundry Unions,** James I. Poole, Fairchild, Foley & Sammond, Milwaukee.

10:30 a.m.—**Developing Effective Employee Communications,** Dr. Paul Mundle—Humber, Mundle & McClary, industrial consulting psychologists, Milwaukee.

12 noon—**Luncheon:** Dr. Kenneth McFarland, educational consultant.

2 p.m.—**The Eneff Ay Foundry Co. Prepares for Negotiations,** a staged presentation by: Herman Menck, Harnischfeger Corp., Milwaukee; C. A. Carolin, R. B. Carolin Foundry & Machine Co., Detroit; J. D. McGill Jr., U. S. Pipe & Foundry Co., North Birmingham, Ala.; D. Russell Gochnour, formerly industrial relations director, Waterbury Farrel Foundry & Machine Co., Waterbury, Conn.; Andrew E. Jencks, J. S. White Co., Pawtucket, R. I.; Martin J. Ewald, Detroit regional counsel, NFA.

5:30 p.m.—**Reception.**

Friday, Nov. 8

9 a.m.—**Management Strategy in Negotiations,** Act II of Thursday's presentation.

12:30 p.m.—**Luncheon: How Public Opinion Affects Management,** by Dilman M. K. Smith, Opinion Research Corp., Princeton, N. J.

2:30 p.m.—**Critique:** Role-players in the presentations will answer questions or discuss the sessions.

"It's that darned worm gear again!"

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FOR HIGH CONDUCTIVITY	ALLOYS 55-C	Be—0.55-0.75% Co—2.40-2.60% Cu—Balance
	AND 35-C	Be—0.25-0.50% Ni—1.40-1.60% Cu—Balance

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Circle 653 on Page 51

WHEELABRATOR STEEL SHOT
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reduces abrasive consumption 45%
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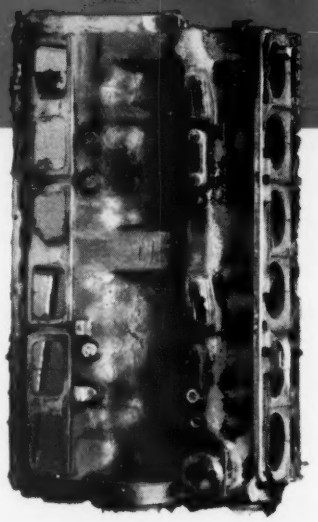
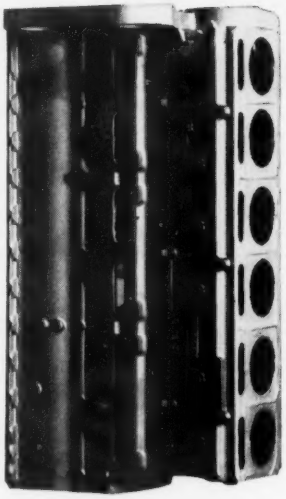


Tests made for one year between heat treated shot and Wheelabrator Steel Shot in a 4-wheel blast machine conclusively proved to the Golden Foundry Company, Columbus, Indiana that Wheelabrator Steel Shot saved them 45% in abrasive consumption. Whereas 18 lbs. of heat treated shot were required per wheel hour, only 10 lbs. of Wheelabrator Steel Shot were consumed for the same period. The actual savings came to 28.4 cents per wheel hour, or $4,957.50 for just one machine in one year. This is based on 4,364 hours of operating time multiplied by 4 wheels for a total of 17,456 wheel hours.

Similar tests by other foundries have shown similar results — some making even more than the 45% savings registered by Golden Foundry Co.

Wheelabrator Steel Shot has brought abrasive savings and reduction in parts wear and maintenance expense to all types of foundries — steel, gray iron, malleable, non-ferrous, large, small, jobbing, production, etc. You, too, can save with this versatile steel shot.



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Foundry Developments

By EDWIN BREMER
Metallurgical Editor

FERROSILICON has an increasing tendency to cause pinholing in nodular cast iron as the aluminum content of the material increases. This circumstance is described in "The Effect of Aluminum on the Inoculating Power of Ferrosilicon and Its Tendency To Give Pinholing" by J. V. Dawson, in the August issue of *Journal of Research and Development* (Birmingham, England).

This effect undoubtedly is due to the sharp rise in the tendency for the iron to pick up hydrogen from the mold. In relatively light-section nodular iron castings, poor inoculation is obtained when the aluminum content is low. Difference is not so obvious in heavier sections. It appears that at least 1 per cent aluminum in the ferrosilicon is necessary for strong inoculating effect in light sections.

Inoculating effect of ferrosilicon in ordinary gray cast iron is increased greatly by the presence of aluminum in the inoculant. That effect also can be obtained by suitable additions of aluminum either before or in conjunction with the ferrosilicon addition. It does not occur when aluminum is added after the ferrosilicon has dissolved. Increased inoculation due to aluminum gives significant improvement in the mechanical properties in the type of gray cast iron used in the experiments (about 1.50 Si, 3.0 TC, 0.78 Mn, 0.114 S, and 0.046 P).

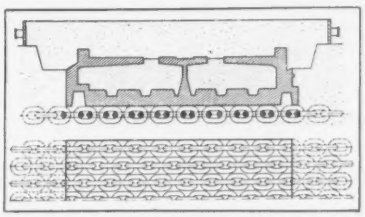
Muscle Building

INVESTIGATION at Armour Research Foundation under contract for Air Materiel Command indicates that properties of aluminum and magnesium castings are improved considerably by press forging and aging. With the 220 aluminum alloy (Al-10 Mg) in the solution-treated state and subjected to 20 per cent deformation by press-forging, the yield strength was increased about 65 per cent and the ultimate strength 50 per cent.

Press-forging of the 356 alloy (7 Si-0.3 Mg) appears limited to strengthening of critical areas where a deformation of 20 per cent followed by aging increases ultimate strength 11 per cent and yield strength 20 per cent. Press-forging AZ 92 magnesium alloy with a deformation of 20 per cent prior to aging results in a plus 19.5 per cent increase in ultimate strength, and a plus 43 per cent in yield strength.

Chain Cools Casting

APPLICATION of open-link chain as a means of obtaining dense structures on sliding surfaces such as on machine tools, is discussed in an article, "A New Method for Chilling of Surfaces of Castings in the Mold," by Erwin Knipp in the Aug. 1 issue of *Giesserei* (Duesseldorf, Germany). As indicated in the accompanying illustration, the chain is laid on the



pattern and then the sand is rammed in place.

The author claims that the chilling or densifying effect is as great as that obtained by use of metal chills. The chains form an armor for the mold wall which proves advantageous, especially in the case of large surfaces, since it eliminates scab formation. Also, the chain provides elasticity to the mold wall, permitting yielding to contraction pressure and eliminating danger of crack formation.

Floats through the Air

LIGHTEST metallic element, lithium, has provided the key to a new aluminum aircraft alloy which maintains high strength at elevated temperatures, according to the Aluminum Co. of America. Developed in the firm's research laboratories at New Kensington, Pa., the new aluminum-lithium alloy will maintain high strength up to 400° F. This means that the thermal barrier which heretofore has threatened aluminum applications in supersonic aircraft has been pushed ahead by more than 100° F.

Alcoa's extensive research with lithium indicates that it not only serves to maintain high strength, but also increases the modulus of elasticity about 8 per cent over that for standard aircraft aluminum alloys. The alloy, designated X2020, also is said to be more than 3 per cent lighter than previous aluminum aircraft alloys.

Stopper

ADVERTISING slogans are no novelty, constantly assailing the public eye and ear through the printed page, radio, television, poster, and billboard to direct attention to a company or a product. One that struck our fancy recently was that of a German firm with reference to its core binder—"Cores like a coconut—Outside hard as stone—Inside soft as butter."

Carbon in Titanium

CARBON determination instruments used for steel now can be applied to ascertain the carbon content in metallic titanium and its alloys, according to investigations at Watertown Arsenal. Instrument used is the Leco CD-10 Conductometric Carbon determinator. Reproducible results were obtained with 1-gram samples of titanium containing less than 0.15 per cent carbon. By using smaller samples higher percentages of carbon could be determined. Accurate results could not be obtained, however, on samples weighing less than 0.20 grams.

Precision of the method compares favorably with conventional techniques, and values obtained indicate that accuracy is satisfactory for titanium. Description of methods are given in "The Determination of Small Amounts of Carbon in Metallic Titanium and Alloys by the Conductometric Method," report PB 131119, available from Office of Technical Services, Department of Commerce, Washington 25, for 50 cents.

Industry Briefs

OGDEN CORP. has acquired Eimco Corp. and American Foundry & Machine Co., both of Salt Lake City, Utah. American Foundry & Machine produces gray iron and steel castings, most of which are used by Eimco in its highway construction, mining, and filtration equipment.

Vanadium Corp. of America, New York, has begun operations in its new ferroalloy plant on a 300-acre site 7 miles southwest of Steubenville, Ohio. One of the company's largest manufacturing operations, the plant will manufacture low-carbon, extra-low-carbon, and high-carbon ferrochromium alloys and a complete line of ferrochrome-silicon alloys. Contemplated for later construction is a unit to manufacture manganese alloys.

Cast-Master Inc., Bedford Heights, Ohio, has added 30,000 sq ft to its manufacturing facilities. A similar, 36,000-sq ft expansion program was completed last year. The current expansion permits the company's entry into the injection molding field as well as broadened service to users of die-casting machines.

International Basic Economy Corp., New York, has purchased the Bellows Co., Akron, manufacturer of pneumatic, hydraulic, and electrical equipment for automated production. No change in management of Bellows is contemplated. The company will operate as a division of IBEC.

Wheelabrator Corp., Mishawaka, Ind., has established a Canadian Division at Scarborough (metropolitan Toronto), Ont. The Scarborough plant will house Canadian Division sales and general offices, warehouse storage, and shipping facilities for the company's airless blast cleaning equipment parts, dust collector parts, and steel abrasives. Manufacturing and assembly facilities will be available gradually. Robert A. Campbell, Canadian district manager since 1946, is general manager of the division.

Archer-Daniels-Midland Co., Minneapolis, has purchased an interest in Revalorizacion de Grasas y Aceites SA, Bilbao, Spain. The expansion is the company's eighth in its foreign operations in less than a year. New facilities are being installed by Regrasa to manufacture, under ADM's technical supervision, many of the industrial chemical products developed and produced by ADM in this country.

Pacific Southern Foundries Inc., Bakersfield, Calif., has broken ground for a new $100,000 unit of a $½ million plant planned for 555 24th St., Bakersfield. The expanded facilities will increase the company's payroll from 208 to 250 persons.

Reynolds Metals Co. will build a $6 million research and office building at Richmond, Va., on a site adjacent to a $10 million building, now nearing completion, which will house the company's executive offices. Reynolds also will move its general sales offices to Richmond, thus consolidating all its managerial activities at one location. The firm's eight manufacturing plants in Louisville will not be affected.

Allis-Chalmers Mfg. Co., Milwaukee, has formed Allis-Chalmers International as a major operating division responsible for all manufacturing, engineering, and sales operations outside the United States and Canada. P. F. Bauer, formerly general manager of the Industrial Equipment Division, has been named managing director.

Linde Co., a division of Union Carbide Corp., New York, plans extensive new facilities for its Tonawanda, N. Y., research laboratories. Plans call for a high-pressure laboratory, metallurgical laboratory, new hydrocarbon storage building, and new services building.

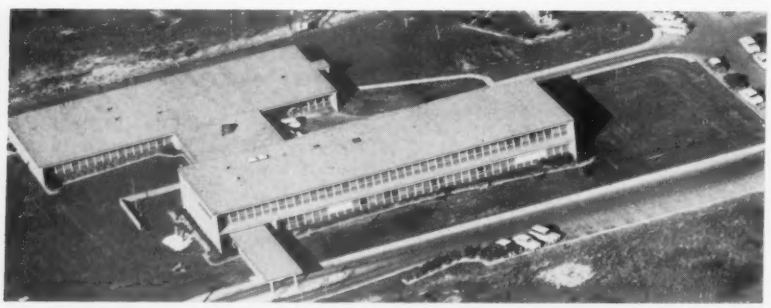
C. W. Dean & Associates, Memphis, have expanded the line of products they represent to include air filter and engine and compressor products of American Air Filter Co., Louisville. Dean & Associates have handled AAF's dust control and ventilating products for many years.

Link-Belt Co., Chicago, has moved into its new 90,000-sq ft plant at 1200 Sycamore St., Montebello, Calif., about 10 miles east of downtown Los Angeles. The new plant will more than double Link-Belt's former manufacturing facilities at 361 South Anderson St.

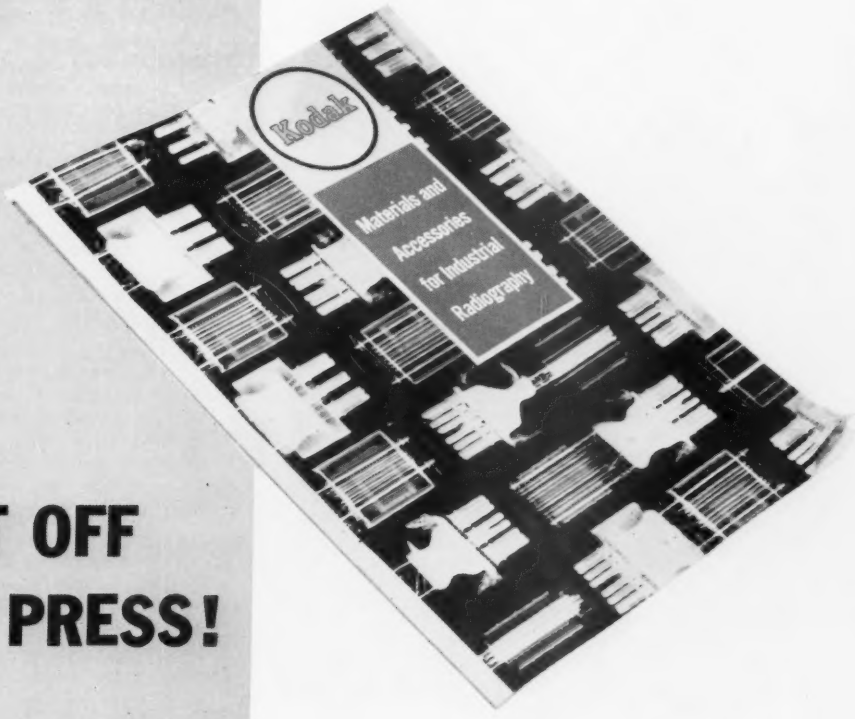
Brooklyn Foundry Co., 170 Broadway, New York 38, N. Y., has been granted a charter of incorporation. Directors are Milton Berlson, Rita Rosen, and Rita G. Maresca, all of 170 Broadway. Papers were filed by Roy Berlin, same address.

Joy Mfg. Co., Pittsburgh, has been approved as a member of the Conveyor Equipment Manufacturers Association, Washington.

Anker-Holth Division, Wellman Engineering Co., Port Huron, Mich., manufacturer of air and hydraulic cylinders and air valves, has appointed the following exclusive



MORE THAN DOUBLED: Construction has begun on an expansion of the Magnet Cove Barium Corp. office and laboratory building in Houston which will add 35,500 sq ft to the facility's present 29,000 sq ft. Another 4000 sq ft will be added to an adjacent garage building. Target date for completion of the expansion is next fall. The addition will be one and two-story reinforced concrete, fireproof-frame construction. Foundations of the two-story section will be built to accommodate eight stories, should they be required



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Circle 655 on Page 51

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Roaring out of the night at 70 miles an hour, the freight train of today is moving thousands of tons — dependent entirely upon the strength, hardness, and toughness of the steel rails to keep it on its path!

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Sold by Pangborn Corporation, Hagerstown, Md., and by leading distributors of foundry supplies from coast to coast.

sales representatives: Components & Equipment Co., 501 Clark Ave., St. Louis 19, Mo.; Garber Engineering Associates, 3916 N. Pennsylvania St., Indianapolis, Ind.; C. E. Gobeil Co., 2635 University Ave., St. Paul, Minn.; and Hummel Technical Products Inc., 90 West St., New York 6, N. Y.

Kirk Cousart & Associates, Charlotte, N. C., have opened an office in the Waynick Bldg., 1882 Pembroke Rd., Greensboro, N. C. They are representatives for air filter, dust control, and engine and compressor products of American Air Filter Co., Louisville.

Electrodos Nacionales SA, an affiliate of Union Carbide Corp., New York, is scheduled to start production in 1958 in its new graphite electrode plant under construction on a 200-acre site at Apodaca, Mexico, about 9 miles from Monterrey.

Pittsburgh Coke & Chemical Co., Pittsburgh, has blown in its blast furnace A after complete relining and installation of new equipment to adapt the furnace for production of standard ferromanganese in addition to that of pig iron.

B & T Machinery Co., Holland, Mich., has appointed Upton Bradeen & James Ltd., Toronto, Ont., Canada, to be exclusive representatives in Canada for its line of diecasting machines.

S & S Aircraft Products Inc., 380 S. Oyster Rd., Hicksville, N. Y., has been incorporated as a machine shop and foundry. Directors are Paul Burlant, George W. Marthen, and Pearl Fox, all of the above address.

Electro Metallurgical Co., a division of Union Carbide Corp., New York, has reduced the price of standard ferromanganese ½ cent across the board, to a new base price of 12¼ cents per pound.

Fraza Lift Truck Service Inc. has been appointed Detroit area distributor for Coles Cranes Inc., Joliet, Ill., manufacturer of material handling equipment.

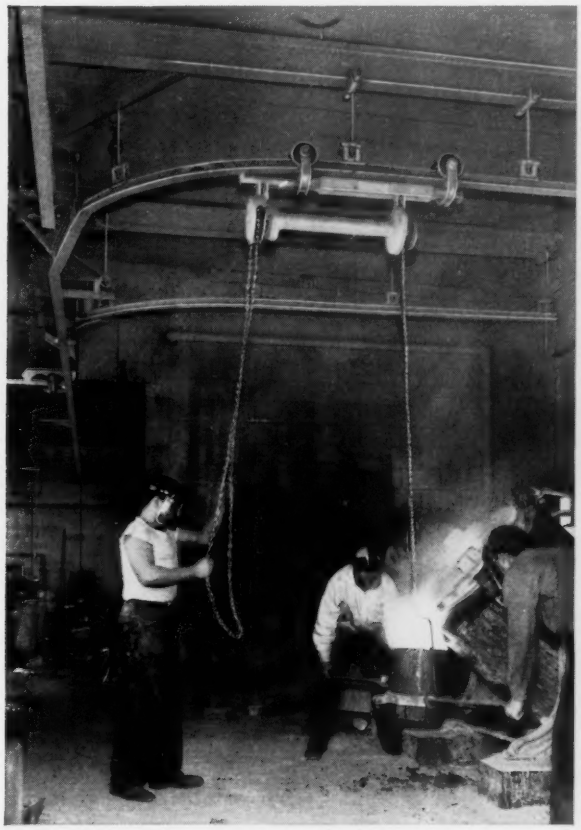
Crown Brass Mfg., Alhambra, Calif., has expanded facilities again to make possible production of a more diversified line of nonferrous castings.

Refractories Division, Babcock & Wilcox Co., New York, has moved its New York district sales office to 135 Cedar St., New York 6, N. Y.

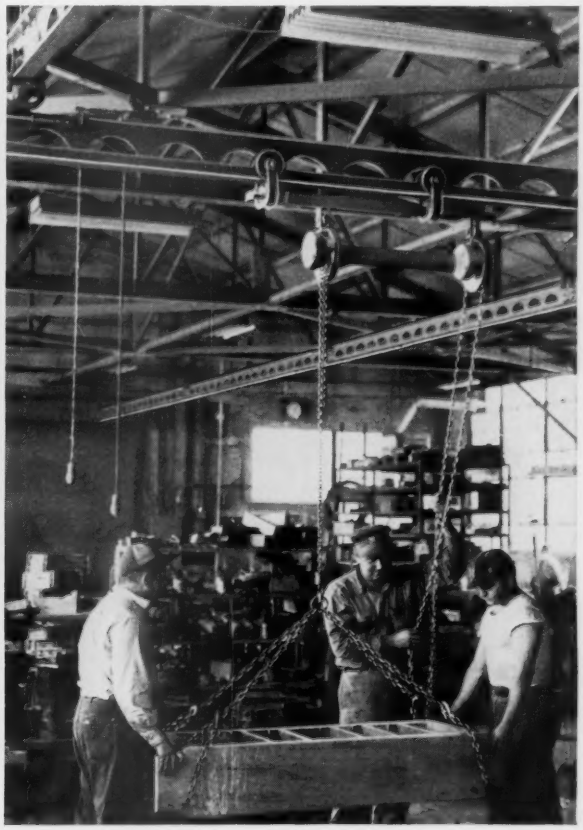
Big Help to Small Foundry

Overhead Tramrail Used for All Heavy Lifting and Conveying

Hot metal is delivered directly from furnaces to molds in shortest time possible with the overhead Tramrail carriers. The carrier seen here can be transferred onto the crane in other photo, thus eliminating in-between handling.



Two 1000 lb. hand-propelled transfer cranes serve the molding and pouring floor.



THE many important advantages that Cleveland Tramrail provides are not limited to large foundries. The Seagrave Corporation, Columbus, Ohio, well known manufacturer of fire-fighting equipment, has a small foundry which is profiting in several ways by a Cleveland Tramrail transfer crane and track system.

The Tramrail is a big aid to safety, does away with the danger of molten metal spilling on the workers' feet and reduces fatigue by removing lifting and carrying work. It saves the workers' backs and legs and enables them to leave at the end of a day nearly as fresh as when they came.

More metal can be poured in less time because 750-lb. crucibles are used now instead of 240-lb. crucibles formerly in the old foundry. With larger crucibles, fewer trips are required to the furnace room. This means less heat loss, faster pouring and better production

The Cleveland Tramrail equipment is rated at 1000 lbs. capacity and is completely hand propelled. It consists of a No. 2100 track and switch system in the furnace room and two transfer cranes over the molding and pouring floor. Metal is taken directly from furnaces to molds without rehandling.

About 3000 lbs. of castings weighing from an ounce to 400 lbs. are produced in an 8-hour day. These are of various brass and bronze alloys for pumps, valves, impellers and suction pipes used on Seagrave fire-fighting apparatus. Only 10 men are employed for the entire foundry operation.

CLEVELAND TRAMRAIL

Overhead Materials Handling Equipment

Write for free booklet—2008.

CLEVELAND TRAMRAIL DIVISION • THE CLEVELAND CRANE & ENGINEERING CO. • 3845 E. 286 St. • WICKLIFFE, OHIO

Line of stationary crucible furnaces is in operation in the bronze melting room of Fischer Casting Co., Middlesex, N. J.

Planning the Melting Department

Of a Nonferrous Foundry

You need to consider furnace type, size, melting capacity, location, and arrangement. Ventilation and metal storage also are important

ESSENTIAL considerations in planning the melting department of a nonferrous foundry are furnace size, type, and melting capacity. Additional thought also is required on the following items: 1. Location of the furnaces with respect to the molding floor. 2. Arrangement of the equipment in the melting room. 3. Proper ventilation of the furnaces and furnace room. 4. Proper metal storage.

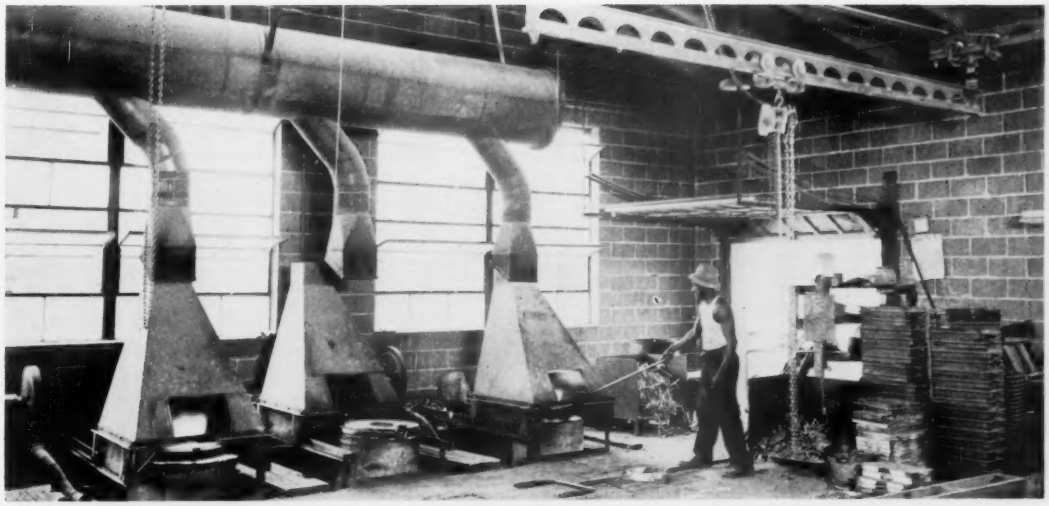
The furnaces should be in a room separate from the molding floor so that undesirable fumes and heat can be vented off independently. This separate room should be near enough to the molding floor or pouring-off stations to limit transportation of hot metal; otherwise metal must be overheated to compensate for temperature drop during a lengthy transfer. Increased fuel usage, zinc loss, reduced crucible service and unnecessary wear and tear on furnaces result from this practice, and it is certainly not conducive to the best quality of metal.

Metal Storage—Metal should be stored under cover in an enclosed building, preferably in a heated storage area, to eliminate any moisture on the ingot. If a heated area cannot be provided for the entire storage of metal, it is advisable to move a sufficient quantity for several days' run of ingot into a dry area. It is advisable to do this to avoid putting wet ingot into the crucible, also to maintain a better quality of metal from the furnace. Gassy metal may result from the introduction of moisture into a molten bath of metal.

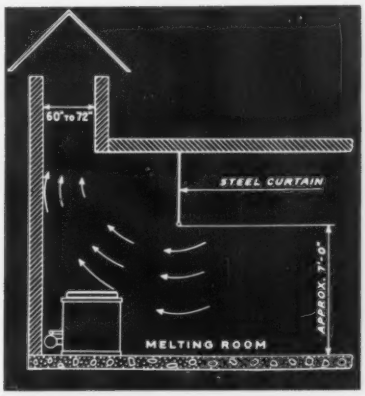
A certain invitation to trouble is to insert a runner into a crucible to bring down overheated metal, particularly if the runner is picked up from a damp foundry floor.

Ventilation — Adequate ventilation is of prime importance. Hoods should be large enough so that natural ventilation takes away both the fumes and heat from the furnace room. The simplest type of ventilation is the least expensive and perhaps the best. For tilting furnaces, an ordinary straight stack of sufficient size, with a flared hood over the furnace, through the roof and a cap over the top, give good results.

Stationary crucible furnaces are most often used in multiples of two or more in a line. The ideal method of venting is to hang a curtain of sheet metal or Transite in front of the furnaces and from the roof to approximately 7 ft above the floor, venting through stacks or a cupola roof. Placement of the curtain in this manner should allow clearance for crucible removal and handling devices such as monorails, etc.



No. 60 crucible furnaces in plant of O'Hare Brass & Aluminum Foundry Co., St. Louis. The hoods roll back easily for removal of pots



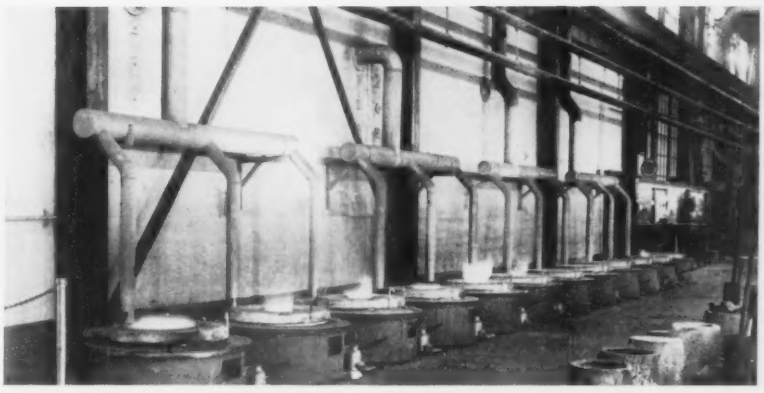
Showing how to vent off gases. Stack is part of the building

Crucible furnaces used in production of die and permanent mold castings

The roof and supporting members for the roof should be made of fireproof materials. Any kind of pipe work, whether it carries gas, oil, compressed air, water, or conduit for power transmission, should be kept out of any hot overhead locations of the furnace room itself.

Fans located in the stack have not been found to be of any particular benefit, and they are expensive to install and maintain. Heat from the furnaces themselves provides the best obtainable sort of ventilation if a clear unobstructed means of escape to the outside is allowed. Hot gases from the furnace rise quickly if not obstructed or slowed down in their movement by pipe bends or other mechanical equipment which often has less capacity than natural draft.

Generally, good ventilation is obtained by using a straight stack of about 30 to 36 in. diam or equiva-



A battery of gas-fired stationary crucible furnaces at the U. S. Naval Gun Factory, Washington. The pipes manifolded to each set of three furnaces supply air at 1-lb pressure for mixing with natural gas

not twice...
not three times...
BUT OVER FIVE TIMES
THE PRODUCTION
and better quality too!

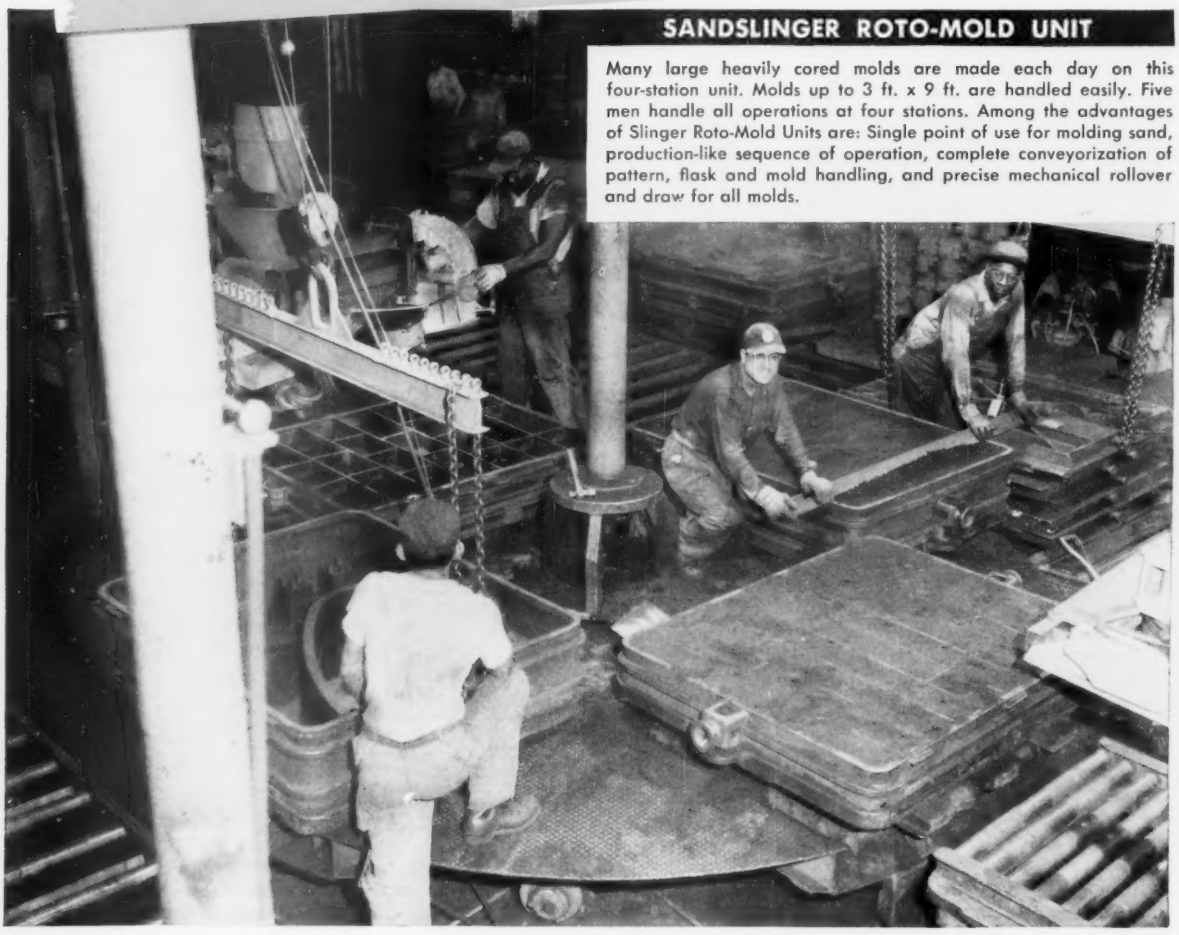
THE AMERICAN MFG. CO. OF TEXAS AT FORT WORTH, manufacturer of an outstanding line of oil field equipment, have recently increased the production of their gray iron foundry by over 500 per cent in virtually the same foundry area. They have done the job by applying production methods to their jobbing work. Their larger castings — weighing from 200 lbs. to a ton — are poured in molds produced on a new Slinger Roto-Mold Unit. This four-station unit permits the foundry to gain all of the production and quality advantages of production methods, while retaining the flexibility which is essential for their work. Fifty different jobs are regularly handled on the unit and six or eight pattern changes are made each day.

Sand for this operation, as well as for all other molding in the foundry, is fully mulled by a Model "60" Speedmullor. This single mullor thoroughly prepares over 200 tons of closely controlled synthetic sand each day. The mullor, equipped with Speedmullor Cooling and Mulltrolmatic Automatic Controls, delivers a fully aerated, cool, fluffy, flowable molding sand for the foundry's molding operations. Slinger ramming and Speedmullor mulling are primarily responsible for the fivefold increased production with increased quality at this recently modernized foundry.

Send for your copy of the BETTER METHODS story featuring the American Mfg. Co. of Texas. Beardsley & Piper, Div. Pettibone Mulliken Corp., 2424 N. Cicero Avenue, Chicago 39, Illinois.

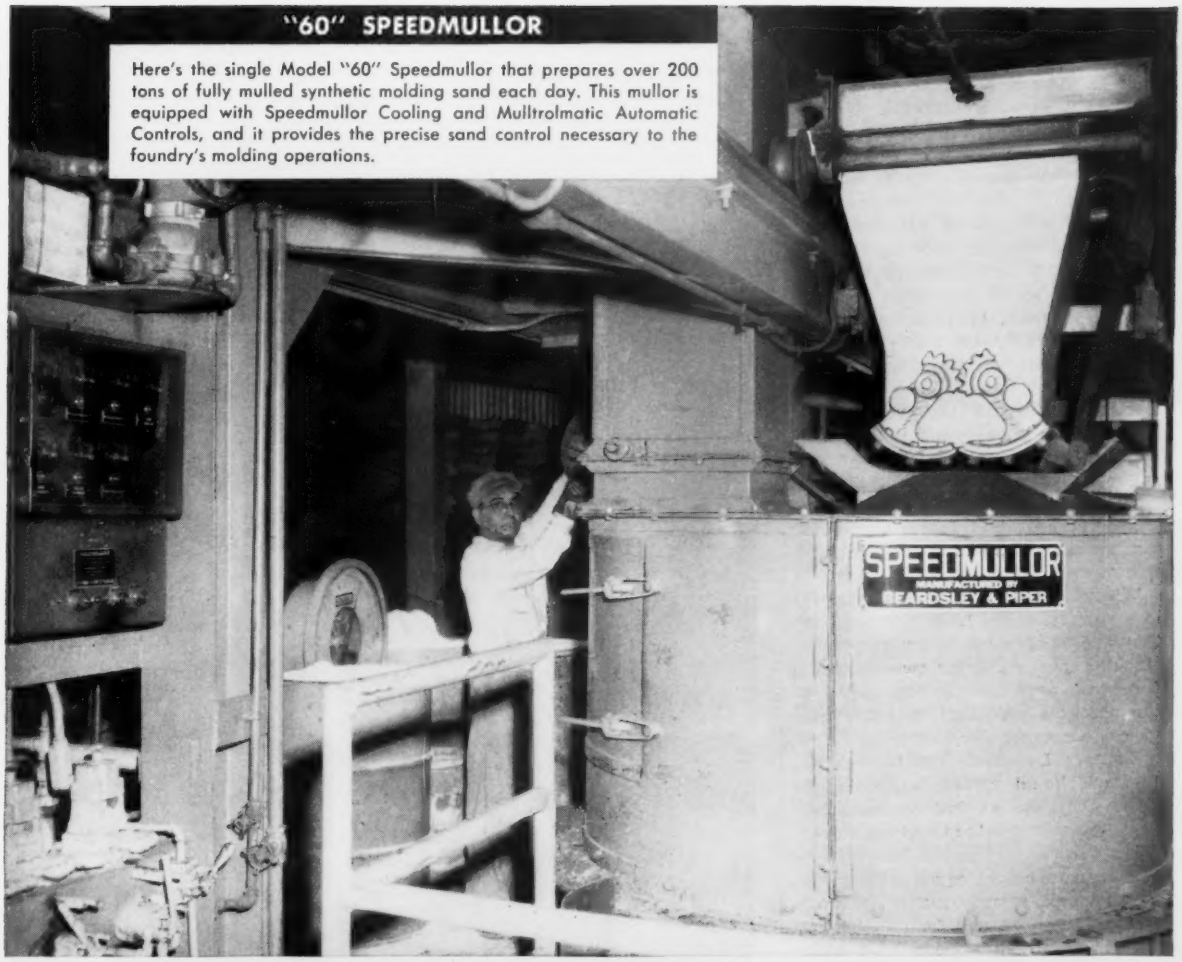
SANDSLINGER ROTO-MOLD UNIT

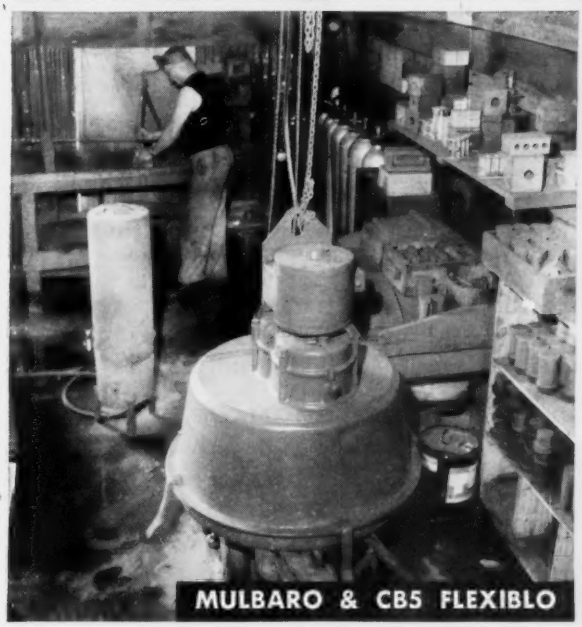
Many large heavily cored molds are made each day on this four-station unit. Molds up to 3 ft. x 9 ft. are handled easily. Five men handle all operations at four stations. Among the advantages of Slinger Roto-Mold Units are: Single point of use for molding sand, production-like sequence of operation, complete conveyorization of pattern, flask and mold handling, and precise mechanical rollover and draw for all molds.



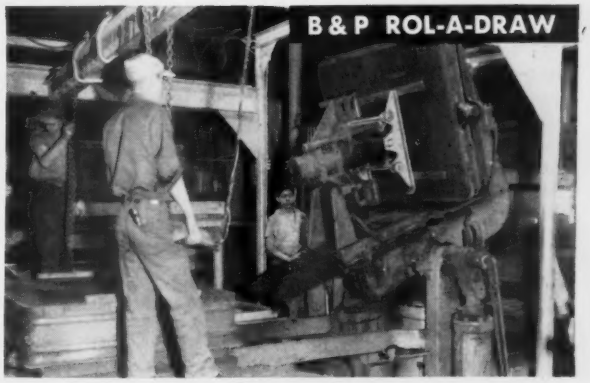
"60" SPEEDMULLOR

Here's the single Model "60" Speedmullor that prepares over 200 tons of fully mulled synthetic molding sand each day. This mullor is equipped with Speedmullor Cooling and Mulltrolmatic Automatic Controls, and it provides the precise sand control necessary to the foundry's molding operations.





This B & P Model 3½ Mulbaro, formerly used to mull facing sand is now used to accurately and thoroughly mull a special CO^2 core sand mixture. The CO^2 sand is used in a CB5 Flexiblo Coreblower, seen in the background.



This 1020 RCX Rol-A-Draw rated at 3,000 lbs. capacity handles over 4,000 lbs. on some of the big Slinger Roto-Mold jobs. The machine provides a precise mechanical draw with a very fast cycle.

lent area, over any size of crucible furnace. A round, square, or rectangular stack can be used. The stack must be carried high enough above the roof to avoid downdrafts.

Special ventilators on top of the stack are of no particular benefit. A plain, cone-shaped cap is satisfactory.

A most satisfactory arrangement is to place the furnaces against a blank wall, with windows on an opposite wall which will open to the prevailing winds, particularly in the summer. In this way, when windows are opened, air will sweep across the foundry floor, across the furnace tops and through the ventilating stacks. It is poor practice to place the furnace in front of windows or any openings in the building where air will come across the furnaces and drive the heat and fumes onto the furnace operators and into the foundry proper.

Where several furnaces are placed in a row, it makes little difference if they are equipped with an individual stack or one stack for two or more furnaces, provided the capacity of the stack is sufficient to allow the gases to escape.

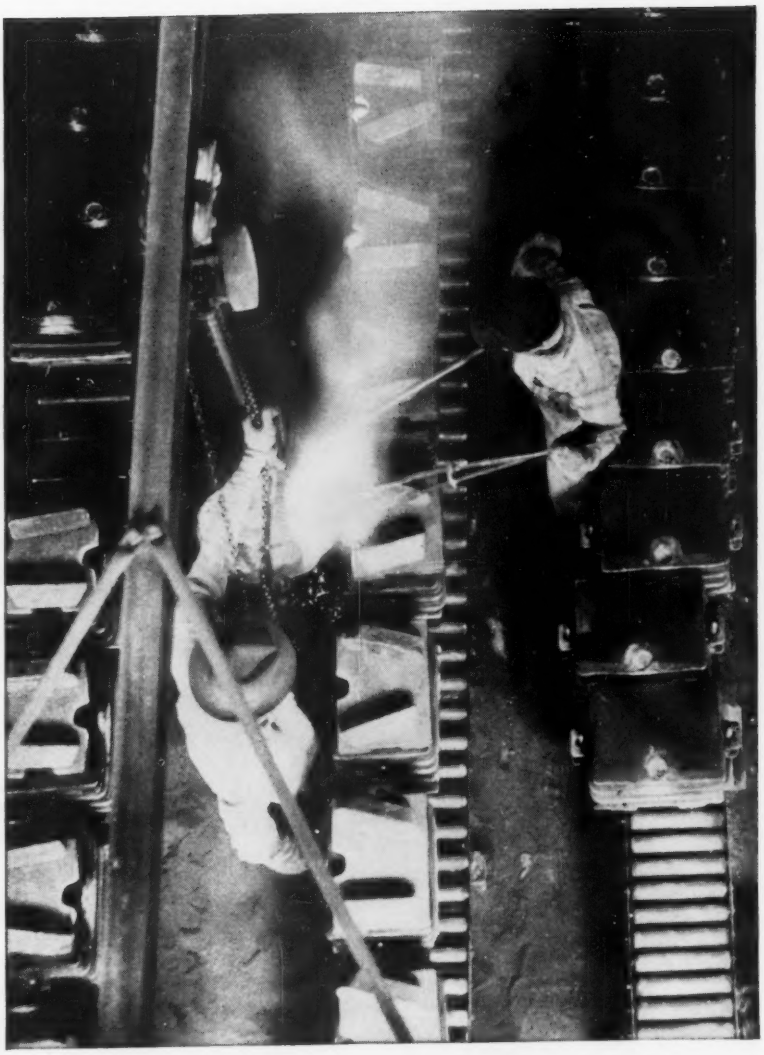
Furnace Location—The top of the furnace should extend high enough above the floor so that the operator does not have to stoop and bend over a hot furnace.

A furnace height of about 18 to 24 in. above the floor is satisfactory for tending the melt and for crucible removal. This would mean that most of the stationary furnaces would have to be put in a pit, although this is a matter of preference and choice on the part of the operator. Crucible sizes up to about No. 100 crucible stationary furnaces can be charged conveniently and crucibles removed when placed on the floor. Larger sizes should preferably be placed in a pit.

Fuel—This discussion of fuel selection is confined to oil and gas. The first consideration, of course, is the price and availability of the fuel. In recent years, natural gas and oil both have become almost equally available, and a brief discussion of how to compare these two fuels follows.

From a cost standpoint, the two can be compared on the basis of thermal value or Btu content. We may consider that one gallon of oil contains 130,000 Btu. In thermal value a gallon of oil equals approximately 130 cu ft of natural gas.

To avoid excessively large figures, a unit called a "therm" is commonly employed. A therm equals 100,000 Btu. It, therefore, requires 100 cu ft of 1000 Btu natural gas to equal



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heat treated, have tensile strength as high as 120,000 psi with correspondingly high yield strength.

FEDERATED MANGANESE BRONZES
have as-cast tensile strength as high as 125,000 psi with good ductility and high hardness.

FEDERATED ENGINEERED BRONZES
all have excellent corrosion resistance.

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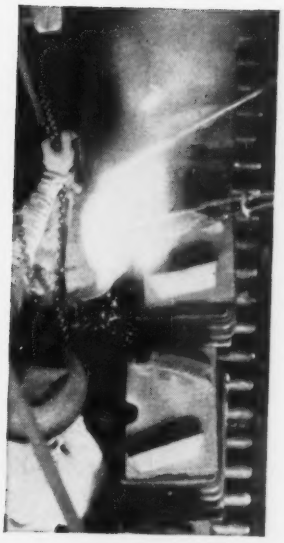

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one therm; or 200 cu ft of 500 Btu per cu ft of manufactured gas to equal one therm. In some areas, industrial rates on natural gas run as low as 50 cents for 1,000,000 Btu, which would be the equivalent of 10 therms and the gas rate would be 5 cents per therm. Since one gallon of oil is the equivalent in therms of 130 cu ft of natural gas, oil at 6.5 cents per gallon would cost the same per therm (100,000 Btu) as natural gas at 50 cents per 1000 cu ft.

Grades of Oil To Be Used—Any grade of fuel oil can be satisfactorily burned in crucible melting furnaces, but oils of a lower gravity than 20° Baume should be preheated for best results. An oil of about 28 to 30° Baume, which is sold commercially as No. 3 oil generally is preferred. This oil flows readily at all ordinary temperatures and is easily atomized by the burner. This promotes a more efficient combustion sufficient to offset its higher cost, so that although the Btu values of the lower grade oil, such as No. 5 oil, are higher and price per gallon is lower, lower efficiency of combustion through poorer atomization nullifies the savings.

Oil Storage—When oil is selected as the fuel, it should be determined whether it would be cheaper to buy it in tank car lots or in smaller quantities, keeping in mind the amount of storage capacity that will have to be made available. In figuring on oil storage, it is well also to consult the Underwriters' and the various local codes governing storage. In most cases, codes and Underwriters' regulations are such that the tank must be buried.

It is not generally necessary to supply the furnace with high-pressure oil, as most oil-fired equipment depends on the combustion air from the blower to do the actual atomization of the oil; 20-lb oil pressure is ample. Where tanks are buried, it is necessary to have a pump to draw the oil out of the storage tank and feed it to the burner. The most desirable arrangement is to place the pump near the tank itself so that the pump is fed by gravity.

Gas Fuel—If gas is chosen as the fuel, the industrial gas department of the local gas company should be consulted. Manufacturers of the furnace will advise the maximum input of gas required for any particular piece of equipment, and the gas company can determine if such quantities can be supplied continuously and recommend the correct size of piping.

Gas rates generally are set up on sliding scales but the gas input into most metal melting equipment is sufficiently large to place the load in a

Circle 659 on Page 51

favorable industrial rate. In many localities, gas is most plentiful during the summer, and many foundries are able to secure a favorable gas rate during that season provided they have standby oil equipment that can be used during any period of curtailment such as in severe weather. Gas companies are required by law to take care of domestic users first.

To estimate the full requirements for crucible furnace operation, allow approximately 2 gallons of oil per 100 lb of red brass melted, or 2500 Btu per lb for gas. For aluminum melting, slightly higher figures should be used.

Cubic feet of air required for combustion of the standard unit of any fuel may be known approximately by dividing the Btu per unit of the fuel by 100. Thus for oil, the 130,000 Btu per gallon divided by 100 equals 1300 cu ft of air; for natural gas, Btu per cu ft of gas equals 1000 which, divided by 100, gives 10 cu ft of air. A pound of coal with 13,000 Btu per lb requires 130 cu ft of air for combustion.

Aluminum Products Manufacturer
Eliminates "Off-Analysis" Heats with

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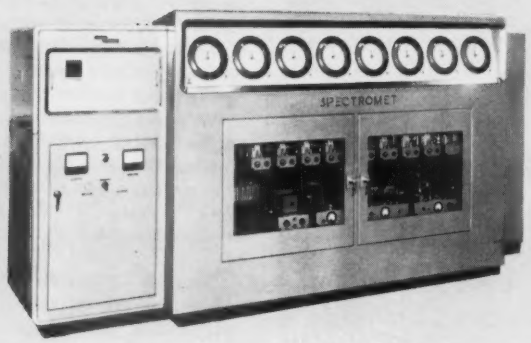

Adams Engineering Company, Inc., Miami, Fla., realizes 8,000 bonus pounds of perfect alloy each month through on-the-spot analyses of molten aluminum samples used in its ABC window and furniture lines. Simultaneous analysis of up to eight elements with the Baird-Atomic Spectromet permits accurate control of each heat before casting. In addition, Adams Engineering can now process perfect alloy from "mixed" aluminum scrap which is 50% less in cost than the former basic material.

The capability of the B-A Spectromet to perform accurately under foundry conditions with high precision makes the instrument invaluable in quality control analyses. The Spectromet's exclusive Automatic Servo Monitor* mechanism maintains correct optical alignment under all operating conditions.

*Patent Applied For

For complete details on the Spectromet write to:

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Type and Size of Furnace—Either stationary or tilting crucible furnaces can be installed for melting. The stationary crucible furnace is the most flexible and versatile for the average jobbing foundry. Stationary crucible furnaces, holding crucible sizes ranging from No. 60 through No. 100, are used extensively for either the production shop or the jobbing foundry that has to run many different alloys. The tilting type crucible furnace is not quite as flexible from the standpoint of melting many alloys. Its primary use is where large castings are being run and large quantities of metal of the same alloy are required. It is impractical to change crucibles back and forth in a tilting furnace.

Foundries making small castings, pouring only 2 to 6 lb of brass in a single mold, will find a stationary crucible furnace best, using a crucible of about a No. 50 or No. 60 size. If the crucible is too big, the metal is generally too cold by the time the last quarter of the crucible is poured.

When To Use Tilting Furnaces

If pouring arrangements are dovetailed properly and the larger quantity of metal generally run in tilting furnaces is disposed of promptly when ready to pour, as will be the case with large castings, then tilting furnaces can be used to advantage. Fuel consumption per pound of metal melted is slightly lower on larger furnaces than on smaller ones. In crucible furnaces of the tilting type, crucible life, as measured in terms of hours in the fire, is generally better since the long lip crucibles are not removed and subjected to the handling that crucibles receive in the stationary furnace.

A typical production foundry melting red brass in stationary furnaces would have multiples of four furnaces using Nos. 60 and 70 or 80 crucibles. Four such furnaces are operated in a cycle so that the first crucible is ready to pour by the time the fourth crucible is ready to charge. With a melting speed of 40 to 60 minutes per crucible, the four furnaces would provide a crucible full of metal every 10 to 15 minutes or, in 8 hours, roughly, about 4 tons of metal.

Generally it does not pay to run a tilting furnace in a much smaller size than No. 125 crucible. On the other hand, for sizes larger than No. 125, the lift-out crucible is less readily handled with a pair of tongs or in the shank so that for the larger size crucibles, the tilting furnaces are most generally used. Stationary furnaces are most widely used with

Circle 660 on Page 51

Air portable disc sander using "81 Coat" Speed-Wet Metalite Discs to speed grinding of die-marks on refrigerator front sheets.

New SPUR ACTION abrasive discs give 2/3 more production

Here is the long-sought answer to both production and cost problems . . . new abrasive belts and discs that not only cut faster—but actually last longer on tough production runs. With the "81 Coat" you get "spur action"—hundreds of rougher, tougher cutting spur points per square inch for faster stock removal. And the strongest resin bond ever gives greater endurance to grinding heat. It's breaking all records for longer mileage. Ask your Behr-Manning representative to prove that "81 Coat" Abrasive Belts and Discs outlast all others by 50%.

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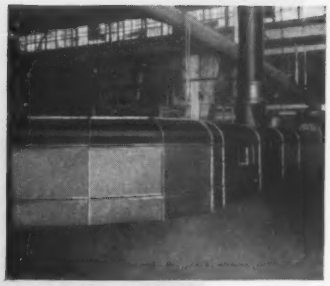

COOLING—Large volume of air passing through cooling tunnel removes fumes, cools molds.

You'll find KIRK & BLUM Systems in leading foundries. To control dust and fumes from all foundry operations, count on KIRK & BLUM for the complete job—design, fabrication and installation.

From 50 years of experience, Kirk & Blum Engineers have gained skill that can be used effectively in your foundry, large or small. For a no-obligation survey or further information, write: The Kirk & Blum Mfg. Co. 3108 Forrer Ave., Cincinnati 9, Ohio.

GRINDING-SNAGGING — Battery of double grinders exhausted by Kirk & Blum system; dry collection.

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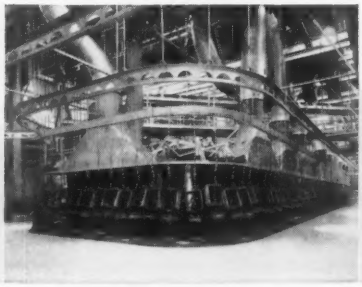
DUST AND FUME CONTROL SYSTEMS



POURING—Hood collect fumes over entire length of moving floor, "Pouring" station.

the smaller crucible sizes.

Average melting time in a No. 80 crucible holding 240 lb of red brass is 30 to 40 minutes.

Average melting time for a No. 400 crucible holding 1200 lb of red brass is 90 to 120 minutes. A No. 400 crucible holding 400 lb of aluminum alloy will melt the charge in 30 minutes.

In no case should the individual heat be larger than can be conveniently disposed of on the molding floor in the shortest time. To have molten metal available and to keep ahead of the molding floor, heats sometimes are made up in advance and held for prolonged periods in the furnace equipment before pouring. This practice increases fuel consumption and is often a source of trouble in maintaining good quality metal and castings because the molten metal during such holding periods may absorb gases.

Melting and Holding Furnaces—Crucible melting and holding furnaces are particularly recommended for the permanent mold and the cold chamber diecasting foundries. A large majority of such shops use the crucible type, fuel-fired furnaces which also predominate in new installations. Flexibility, economy, and simplicity of operation again, as in other applications, favor the crucible furnace.

When the workday or workweek is over, fuel and air are shut off at the burner without injury to the furnace. With fully insulated furnaces, working conditions are favorable and with thermostatic control and automatic burner operation, little supervision is required and metal quality remains uniform.

The carbon-bonded or ceramic-bonded crucibles are much more economical for melting aluminum alloys for either diecasting or green sand molding than iron pots. Initial cost of the crucible is about the same as a good quality alloy iron pot. However, the latter cannot be force-fired due to its poor resistance to oxidation at red heat. The refractory crucible, on the other hand, can withstand the maximum furnace temperature and melting is faster and fuel consumption actually less. Considering the much greater specific thermal conductivity of the iron pot, these claims for the crucible seem incomprehensible. However, the answer lies in the increase in furnace efficiency with increase in thermal input.

Editor's Note: This article is one chapter of *Crucible Melting Handbook*, published by the Crucible Manufacturers' Association, 11 West 42nd St., New York. It is adapted from the instruction and furnace manual of Stroman Furnace & Engineering Co., Franklin Park, Ill.

In Canada: Behr-Manning (Canada) Ltd., Brantford. For Export: Norton Behr-Manning Overseas Inc., Troy, N. Y., U.S.A.

Circle 661 on Page 51

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Miller® AIR CYLINDERS

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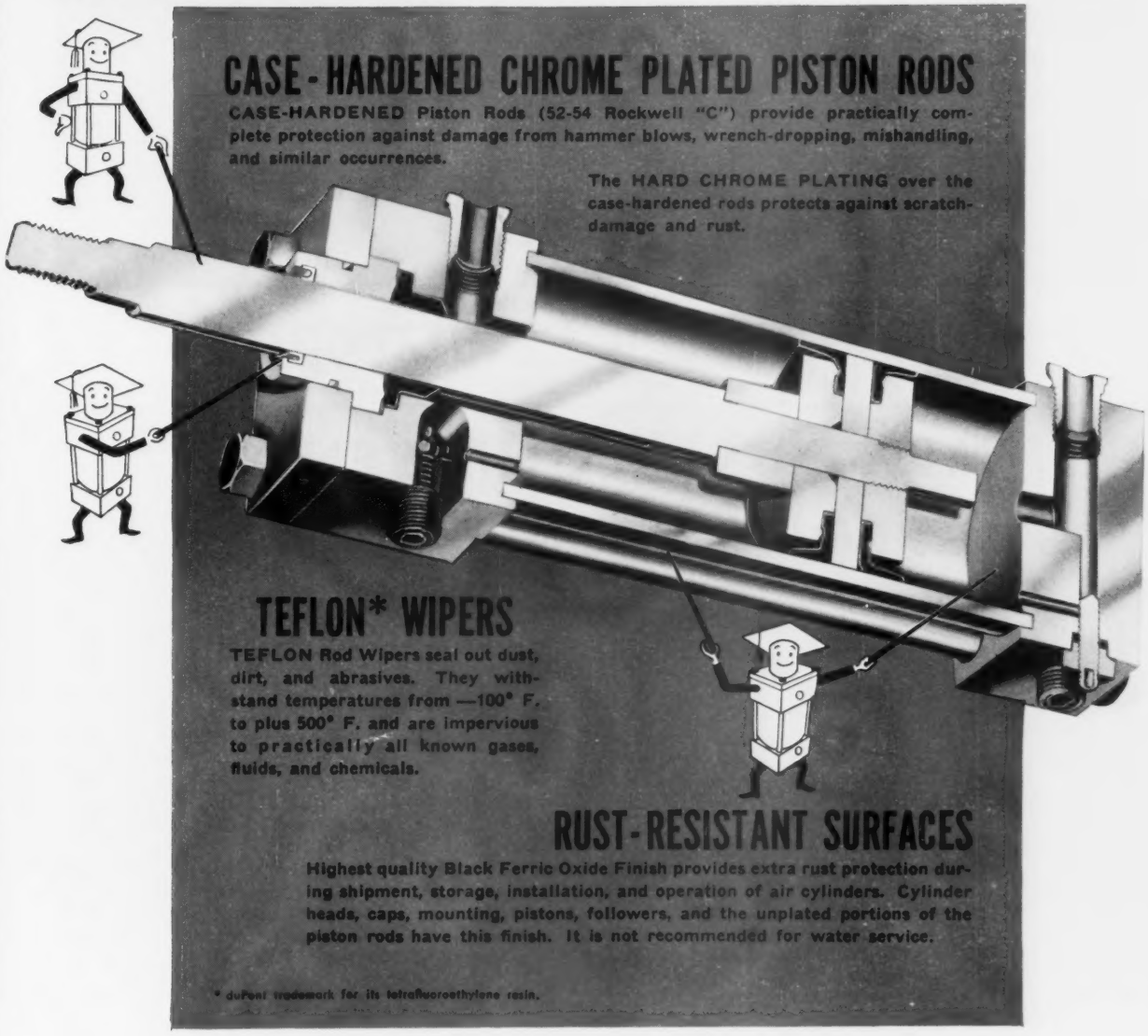

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CASE-HARDENED Piston Rods (52-54 Rockwell "C") provide practically complete protection against damage from hammer blows, wrench-dropping, mishandling, and similar occurrences.

The **HARD CHROME PLATING** over the case-hardened rods protects against scratch-damage and rust.

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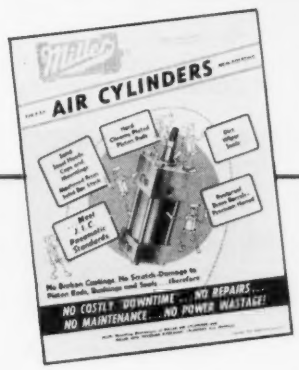
* duPont trademark for its tetrafluoroethylene resin.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Hard Chrome Plated Piston Rods
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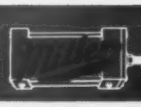

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The registration area was the scene of much activity on opening day

MISSOURI CONFERENCE

Stresses Operating Practice

By ROBERT H. HERRMANN
Associate Editor

NEARLY 200 foundrymen gathered at Rolla, Mo., Sept. 27-28 to attend the Missouri Valley Regional Conference. Held at the University of Missouri, School of Mines & Metallurgy, the conference was cosponsored by the School of Mines, its AFS Student Chapter and the St. Louis, Mo-Kan, and Tri-State AFS Chapters.

During the meeting, the student foundry at the university, a participant in the Foundry Educational Foundation scholarship program, was open for visitation. Equipment donations by firms interested in the FEF program offer students a fine physical setup for the foundry study program.

Following a short address of welcome by Dean Curtis L. Wilson, Missouri School of Mines and Metallurgy, Harry W. Dietert, Harry W. Dietert Co., Detroit, and national AFS president, spoke on **The American Foundrymen's Society and Foundry Progress.**

He traced man's advancement from 1 million BC to the present, citing various leader groups which have influenced progress. Today, individuals, with their production and research skills, are considered as having the most influence on progress. The knowhow they possess is more important than casting tonnage, casting size, or other materialistic records. Modern foundry management has much to gain by realizing that fact.

Mr. Dietert also spoke of the need for foundrymen to take a positive approach in their thinking and in publicizing the industry. Too much emphasis is placed on casting de-

Seated at the conference luncheon speakers' table, left to right, are: T. F. Shadwick, J. A. Cannon, E. J. Walsh, C. V. Nass, W. W. Maloney, R. W. Trimble, H. W. Dietert, W. L. Kammerer, A. C. Weber, Dean C. L. Wilson, Conference Chairman H. C. Deterding, Dr. D. S. Eppelsheimer, R. V. Wolf, A. G. Wehr, J. O. Eppright, and E. W. O'Brien

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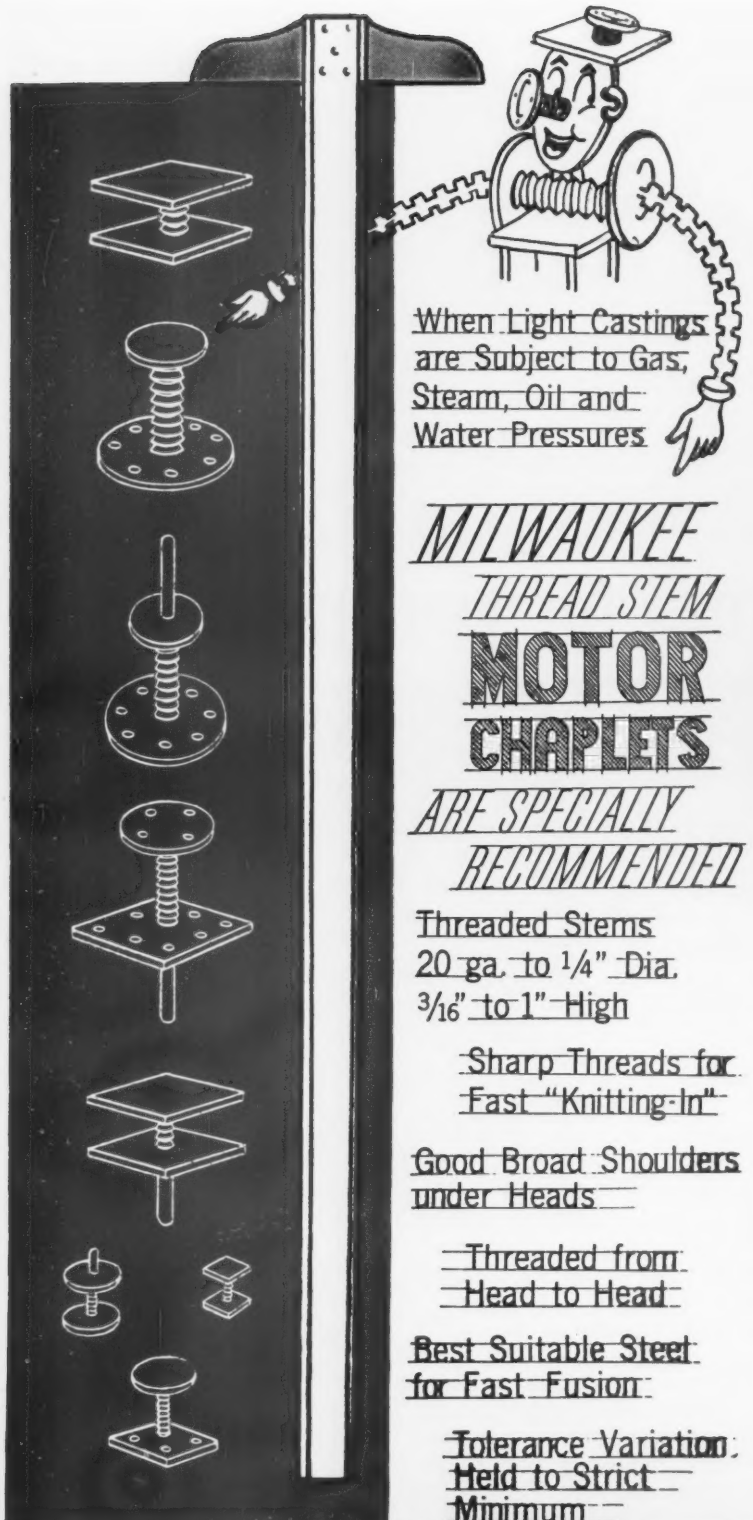
When Light Castings are Subject to Gas, Steam, Oil and Water Pressures
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Threaded Stems
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Sharp Threads for Fast "Knitting-In"
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fects rather than on quality control. Along this line, the AFS is replacing its Castings Defect Committee with a Castings Quality Control Committee.

Gating To Control Pouring Rate and Its Effect on Castings, by Charles E. Drury, plant manager, Central Foundry Division, General Motors Corp., Danville, Ill. Tests were conducted on automatic jolt squeeze machines under production conditions with sand properties closely controlled. Results showed that reducing shoulder width in a sprue cup or decreasing the angle from the vertical of the cup side walls increases pouring rate. Also,

CHARLES E. DRURY
General Session Speaker

pouring rate increases as the sprue area approaches the smallest area in the gating system.

Varying sprue length by changing cope height does not affect pouring rate. The pressure head is determined by height of the ladle from the mold parting line. Pouring rate increases as runner area increases until that area equals the sprue area.

Runner chokes control pouring rate if they are the least area in the gating system. Strains, swells, run-outs, and core washes can be minimized by choking the runners to reduce pouring rate. But misruns can be reduced by eliminating chokes and increasing pouring rate.

Raising the ladle from zero to 12 in. above the cope increases pouring rate; at heights above 12 in. rate decreases slightly.

In a short talk at the conference luncheon, William W. Maloney, AFS general manager, discussed the society's Training & Research Institute program, stating that the first seven educational courses for foundrymen in the middle supervision level have been so over-registered that repeat courses are being offered. He also spoke of the national convention to

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be held in Cleveland May 19-23.

Short talks also were made by C. V. Nass, Beardsley & Piper Division, Pettibone Mulliken Corp., Chicago, FEF president; and E. J. Walsh, FEF executive director, who told of FEF studies on ways to educate users on the advantages of castings and on ways to solve the manpower need in foundries.

Principal luncheon speaker was A. Carl Weber, Laclede Steel Co., St. Louis.

GRAY IRON

Inoculation and Alloying Agents for Gray Cast Iron, by Howard H. Wilder, manager, engineering sales, Vanadium Corp. of America, Chicago. Theoretically inoculation supplies nucleation particles which artificially promote freezing at higher temperature, thus eliminating undercooled structures. Certain gases, however, such as hydrogen, oxygen, and nitrogen, may reduce nucleation rate during solidification, inducing undercooling. Various inoculants control microstructure, graphite distribution, or control chill depth without sacrificing properties. They also promote uniform machinability. Several typical inoculants were described. The fact is that inoculation is only supplementary to good foundry practice.

Melting, Molding and Men, by Harry H. Kessler, manager foundry operations, Sorbo-Mat Process Engineers, St. Louis. Uniform quality iron can be produced only by controlling raw materials as well as composition. A 50 per cent steel mix using rail steel is different from one using mild steel plate, although analyses are identical. Physicals, microstructures, and shrinkage characteristics are different. Also, identical composition pig irons made by the hot and cold blast methods produce different irons.

Proper riser size may be calculated on the basis of relationships between area and perimeter and the liquid shrinkage for the metal specification. Risers must provide adequate mass below point of contact with the casting to maintain fluidity between riser and casting. Inclusions can be removed from metal by spin gating and choking in sprues and runners. Runners should be higher than ingates, and ingates should be of minimum size to reduce cleaning time.

Molding Sands, Molding Methods, and Casting Dimensions, by J. S. Schumacher, chief engineer, Hill & Griffith Co., Cincinnati. Dimensionally controlled castings can be produced in green sand if the sand has uniform and reasonably high relative density—90-95 per cent of maximum density obtainable for a given sand. Also the sand should have green strength over 15 psi and hardness of at least 90. Initial sand density should be over 60 lb cu ft if most effective use is to be made of jolt energy. During molding, the sand should be capable of reaching the desired density, hardness, and strength readily. Molding equipment must be capable of producing molds of uniform and high relative density.

Casting Defects, by William A. Hambley, service engineer, Chas. A. Krause Milling Co., Milwaukee. Reducing scrap is a management responsibility. It can be done with high economic returns by determining sound, basic, unbiased facts about causes of scrap and developing a quality control program from them. Then the program should be put into effect with strong authority behind it and kept operating with continuous accumulation and recording of data and application of corrective procedures. The entire project requires teamwork between management, supervision, and production workers and a strong will to succeed.

NONFERROUS

What's New Among Nonferrous Foundrymen? by Herbert F. Scobie, executive secretary, Non-Ferrous Founders' Society, Chicago. No new tools made available to the industry have replaced the old tools. Rather, the new ideas have stimulated improvements in older ideas. Thus, the industry has gained good new tools and improved old tools. Some new developments include easy to store and handle mica strainer cores usable with all metals. They create no problem in remelting gates. Adhesive-backed, plastic patches 0.005 to 0.007 in. thick may be stuck in coreboxes to minimize abrasion during blowing. They are said to last 5000 blows at 135 psi. An aircraft manufacturer has developed a new aluminum casting alloy known as 42B for use in sand and permanent molds. It may be used for parts previously forged.

There is a trend today toward marketing castings aggressively with emphasis on redesigning parts to be made as castings with improved performance.

Production of Quality Aluminum Castings, by Charles F. Maxwell, chief metallurgist, Howard Foundry Co., Chicago. Production of quality castings is related directly to a control plan. In the Howard Foundry aluminum division that plan is under the authority of the laboratory and merges with requirements of the production and engineering departments. Strict control is maintained over incoming raw materials and over-all processes in castings pro-

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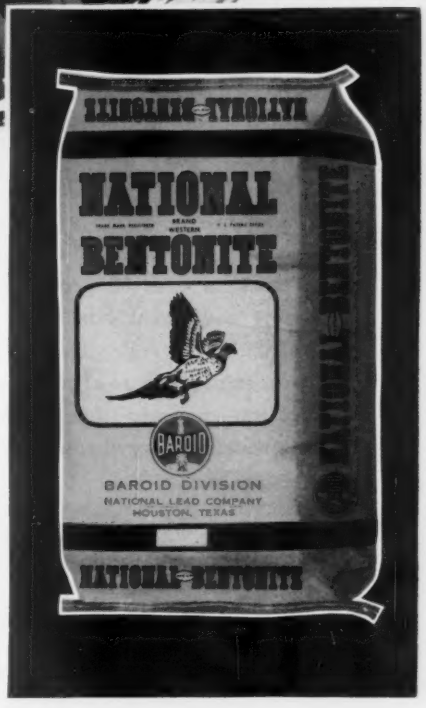

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Most plant operating people, when they buy conveying systems, are looking for the equipment that is best for **their** plant—equipment that is designed to meet their individual requirements. They are looking beyond the price . . . looking to quality—to dependability. Mathews engineers have been designing and building conveying systems for over 50 years, and a great amount of this equipment has been applied in foundries. This is why operating people everywhere have an extra measure of confidence in Mathews equipment—and why you see Mathews Conveyers in foundries everywhere.

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duction. Casting quality is more than opinion; it is the measured performance of a foundry in producing complex and simple parts to the highest standards. It is good business to show evidence of such quality control in every casting shipped to a customer.

Permanent Molding of Aluminum Castings, by C. B. Curtis, chief plant process engineer, Maytag Co., Newton, Iowa. In 1949, Maytag started converting all castings production into diecasting or permanent molding. The transition was completed in 1952. At present an aluminum gear case and the gear case cover are produced in permanent molds. Maytag's experience indicates that these

HARRY W. DIETERT
AFS President

parts may be produced economically, with high quality and strength, by permanent molding. The method fits well into the company's mechanized foundry. Initial and replacement costs for molds and operating fixtures have been reasonable compared with high-pressure metal molds. The process has provided an as-cast shape which requires minimum finishing and has permitted use of alloys which are machinable without age hardening.

Pros and Cons of Centrifugal Castings, by M. E. Nevins, president, Wisconsin Centrifugal Foundry Inc., Waukesha, Wis. The foundry makes bronze, aluminum and stainless steel castings by the true centrifugal process. Average run is 25 pieces. Dies are machined graphite and may be reused by additional machining for a new job. All castings are finish machined. Claimed advantages for the process are that it produces sound castings with good surfaces and physical properties, machining of castings permits complete inspection, net costs are low, and dies are relatively inexpensive. Disadvantages

End jar-caused maintenance with TABOR-SHOCKLESS FULL-POWER JOLT

Earthquake shocks that used to be a necessary evil in foundry (particularly core-room) operation can now be avoided without loss of full-power jolt. It's the Tabor-shockless principle that does the trick.

The Tabor Power-Rollover, Power-Draw Machine shown here gives full ramming effect on the sand . . . with shock divided between the falling table and the rising anvil. Reduces costly maintenance on the machine itself, and on surrounding equipment.

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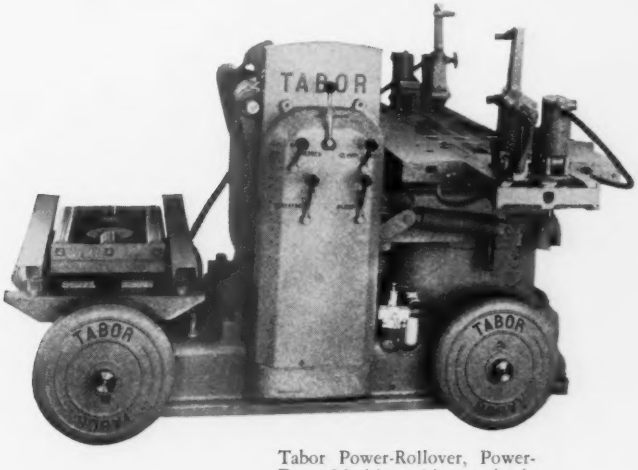

Tabor Power-Rollover, Power-Draw Machine with completely shockless full-power jolt.

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given are that parts of all shapes cannot be cast, the process is uneconomical in some cases, and certain dangers are inherent in the process.

STEEL

Designing Valves for Sound Castings, by Arnold S. Grot, chief metallurgist, Edwards Valves Inc., East Chicago, Ind. Design and development practices at Edwards Valves were discussed. Emphasis was placed on the necessity of integrating changes in design and foundry methods. Top-quality patterns, careful workmanship, good over-all foundry practice, and close adherence to a quality control program are needed.

Unionarc Welding as Applied to the Foundry Industry, by H. T. Smith, manager of engineering services, Linde Co., St. Louis. New welding process for carbon steel uses a magnetic-flux, gas-shielded arc. Components of the process include bare welding wire, magnetizable flux, CO_2, direct current, and a means for controlling feeding of wire, flux, gas, and current. Use of the process for repair welding mild steel valve castings, diesel locomotive truck frames, and rock crusher castings was described.

The Arcair Process, by M. D. Stepath, president, Arcair Co., Lancaster, Ohio. Latest developments in castings repair with a torch using an electric arc and an air jet were discussed. The process is said to be efficient in removing surface defects prior to welding. Ribs, fins, and riser pads also can be removed.

Where To? CO_2-set Cores for Steel Castings, by James Venetucci, foundry engineer, Liquid Carbonic Corp., Chicago. Binders have been improved from simple sodium-silicate solutions to silica-alkali mixtures with various viscosity and Baume readings. The low-viscosity silicates react quickly to CO_2 because the gas can permeate the sand easily. Sand mixtures with good shakeout characteristics can be produced with binders having low alkali ratio, viscosity and Baume readings. Binders with high viscosity and Baume readings offer some green strength but require longer gassing times and have comparatively poor collapsibility. Sugars and carbonaceous materials may be added to sand mixtures to aid collapsibility.

An all-purpose mixture cannot be used to provide maximum and minimum strength values.

Fine sands offer a high surface area, thus they are lightly coated with binder. Gassing time is reduced. Cores have a high initial strength and decreased strength after standing. The opposite is true of coarse sands.

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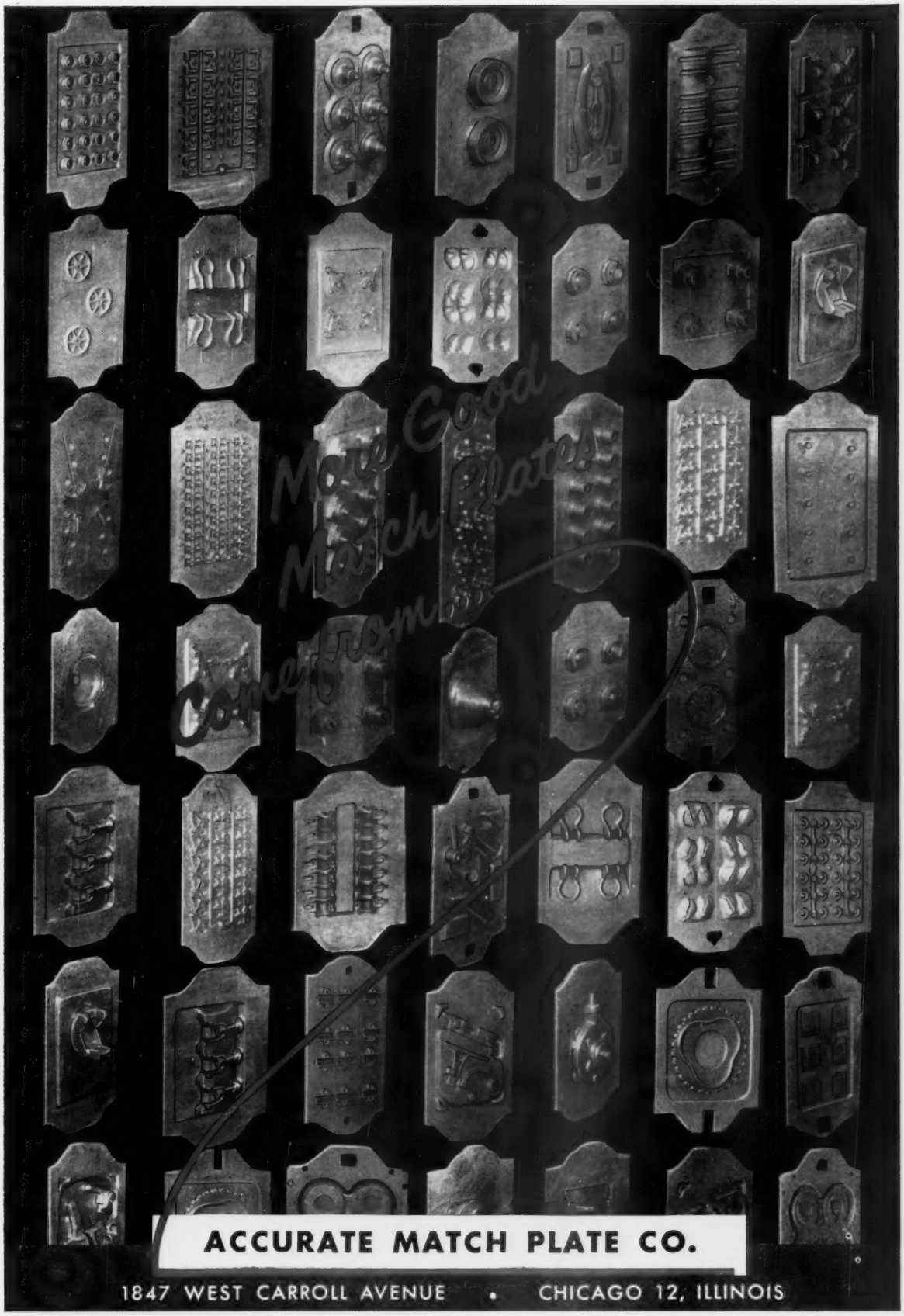

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Man to Man

By RALPH L. LEE, *President*

Lee Hobby Foundry
Birmingham, Mich.

"There is a reason for anything anybody ever does. Behavior equals kind of people times conditions, divided by the shape they're in"

People Problems and Problem People

I FIND as the president of the Lee Hobby Foundry that when you go on your own, all you do is to get rid of the boss you had and take on a flock of others, among whom will be your customers, who can be tyrants at times. Being your own boss, as many neophytes (not quite dry behind the ears) dream of being, isn't all it's cracked up to be.

There's another disadvantage in being and running the whole works: When the metal's too cold, the sand too weak, or the rapping too heavy, there's no one to blow your top to except yourself. Even more importantly, there's no one to help you keep out of trouble.

Anyway you look at it, trying to be the whole cheese lowers the ceiling on you and sets up a fixed limit on how far you can get and how big you can grow, regardless of how much you know or what you can do all by yourself. So managing to get things done through others with your own hands tied behind your back, so to speak, seems to be the only road that leads to high places—a road which, by the way, is just about the rockiest, strength-sappingest, nerve-snappingest, and patience-tryingest one a person can take.

The How-To Approach—This must be so, for you can hardly pick up a trade journal nowadays, including one of the very best, FOUNDRY, without running smack dab into featured articles on "How To Do It," "How To Be A Better Boss." "How To Be A Better Manager," "How To Get More From People Using Machine Tools," "How To Get More Sales From Salesmen," "How To Cut Costs," and the like.

Most of such articles I have read—and I read 'em all—are almost in recipe form, with well defined steps, specific details, and charts and curves. I haven't the slightest doubt that those who need this information the most would profit from wading through it, even though it usually contains a lot of dope they were brought up on.

I can't help feel, however, that most of these recipes for getting things done through other people were written as though the only people we can get to work through come more nearly up to specifications than people really do and as though they are much more predictable than they really are. There doesn't seem to be enough stretch in some of these recipes to allow for the fact that no two people can be dealt with the same—or any one individual the same all the time. From my experience, a lot of Robin Hood's barns have to be gone around—special cases that no set procedure possibly could have foreseen.

There isn't the slightest doubt in my mind that with all due credit to the best of organization structures and standardized management procedures, the biggest single factor in getting things done through other people is the ability to recognize the difference between what people deliberately do or fail to do and what they can't help doing or are incapable of doing.

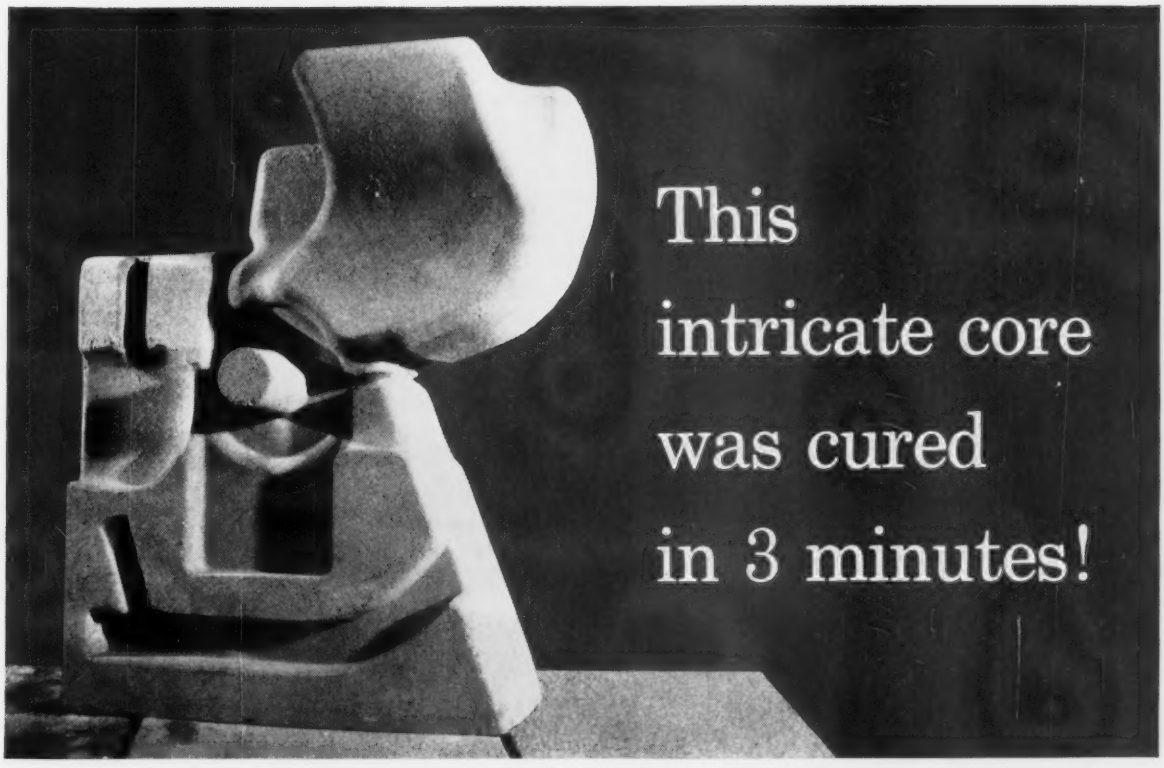
Everybody is different

A mistaken notion about this matter can, in my opinion, wreck even the most time-proved recipe or procedure for supervising, directing, or managing others. It not only can, but it does—and frequently with careers in the midst of the wreckage.

The Inborn Factory—I do hope that I never become a pest by insisting, as I have for many years, that the behavior of individuals is far more subject to inborn factors than most people suspect. I used to feel quite daring in making this observation, but no longer. Authentic research in this field has accumulated to the point where there no longer remains the slightest doubt in my mind that the behavior patterns by which we can recognize one person from another have the same source as the shape of heads, color of eyes, height, and all the other physical characteristics, including differences in internal organs.

But even without laboratory research, it seems to me that any of us who have worked for, with, and through people we really know would be blind if we couldn't identify, without thought, the instinctive Bullies, Smoothies, Crybabies, Pouters, Cooperators, Coolheads, Hotheads, and dozens of other personalities.

Some folks fight against this fact in the belief—or rather hope—that anyone can change as much as he wants to change. In my opinion,



New sodium silicate-CO_2 process speeds production . . . cuts costs

Green cores and molds are ready for the metal-pouring line immediately after gassing when the new sodium silicate-carbon dioxide process is used. No time-consuming oven baking is required. The production cycle is faster . . . costs are lower.

In addition, leading foundries using the new method find that CO_2-cured cores resist breakage, hot tears and cracks . . . can be made to extremely close tolerances. Foundry personnel like the new process because it has no fumes or objectionable odors.

High-quality Du Pont sodium silicate is available in formulated products for CO_2 systems from foundry supply houses throughout the country.

Ask your foundry supply representative for his recommendations for specific formulations containing Du Pont sodium silicate.

● Fine core sand and a binder based on Du Pont sodium silicate (above) are mixed easily with standard mulling equipment. CO_2 is injected into core (below). Chemical reaction converts silicate into strong gel that binds sand grains together in a firm, easy-to-handle core.

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BETTER THINGS FOR BETTER LIVING . . . THROUGH CHEMISTRY

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they have a point, within limits. I like to think of it this way. Anyone can change as much as he needs to change to make the most of things about himself he can't change. As Boss Kettering said recently, "Even if we could change them, we'd better not. They might be worse." In my opinion this isn't merely a joke, either, regarding changes in ourselves or others.

I don't imagine any of us ever will be wise enough to tell accurately the difference between voluntary and involuntary behavior, but of this I'm quite sure: The more nearly we are able to do so, the better job we'll be able to do working through others. And I'd like to add that we'll have more fun as we go along by approaching each individual, no matter what he seems to be, as the subject for an interesting bit of unbiased, impersonal research project, with the promise of some very useful results, both to the subject and ourselves.

Elementary Facts—I'm suggesting that in our efforts to apply the attractive recipes for improving our supervisory or management batting average, we take into account the following elementary but powerful facts:

1. Everyone (without exception, that is) is different and the only one of his kind in all the world.
2. No one can change as much as either we or he might like. (All of us can change as much as we need to do our best.)
3. No one's the same all of the time.
4. It's natural and right to be proud of being different. (What a mess we would be in if we weren't.)

These four facts, once accepted, lead to this conviction: There always is a reason for anything anybody overdoes. Behavior equals kind of people times conditions, divided by the shape they're in.

It seems to me that with this conviction, we can approach any people problem or problem people with a determination to get the underlying reason, in exactly the same frame of mind we approach a mechanical or metallurgical problem.

The payoff is handsome. Feuding is avoided, cockeyed biases are eliminated, top-blowing is seldom, self pity is cut to the quick. There'll be another benefit—we'll be able to master the most important art of all, making everyone feel comfortably himself in our presence.

I'm going to blame this outpouring on an overpowering instinct.

Steel Founders' Conference To Hear British Lecture

Approximately 30 papers are on the program for the 12th annual Technical and Operating Conference of the Steel Founders' Society of America. It will be held at Hotel Carter, Cleveland, Nov. 11-13.

New to the program will be the first exchange lecture between the British Steel Castings Research Association and SFSA. The British lecture will cover "The Carbon Rod Resistor Furnace and Its Application to Steelmaking Practice" and "The Use of the Dip Thermocouple Technique in British Foundry Practice" and will be presented by T. A. Cosh and L. W. Sanders.

Mr. Cosh joined the staff of the BSCRA in 1952 following extensive metallurgical experience, and presently is head of the association's steelmaking section. Mr. Sanders, for the last 18 years chief metallurgist, Lake & Elliot Ltd., Braintree, Essex, Engand, has been with that organization for 35 years.

Conference talks are grouped under these four main discussion topics: Melting and Deoxidation; Foundry Research and Operations; Efficiency Measurements; Quality Control through Patternmaking and Design. In addition, a panel session entitled "I Have a Problem" will be devoted to analysis of various problems submitted by member companies.

T. A. COSH

L. W. SANDERS

At the Monday luncheon, G. L. Gorbell, manager, safety and fire protection, personnel relations, Monsanto Chemical Co., St. Louis, will discuss "The Importance of the Supervisor in a Well Balanced Safety Program."

I. M. Emery, Massillon Steel Casting Co., Massillon, Ohio, is chairman of the society's Technical and Operating Committee sponsoring the conference.

HOW TO DO IT

Shifting Position of Wire Rope On Drum Increases Service Life

LENGTHENING THE LIFE of wire rope is possible by shifting it periodically to distribute wear or by reversing the position of the rope on the drum, according to the Wickwire Spencer Steel Div., Colorado Fuel & Iron Corp., New York.

Critical wear points include that portion of the rope in contact with the sheaves as the load is picked up and the portion of the rope that winds on the drum as the load is accelerated. The section which contacts the drum flange and rises to the next layer on the drum in multiple layer winding also is subject to excessive wear and distortion.

Shifting the rope during its life will distribute such severe wear over a longer length of rope. That can be done by using a longer rope than required and periodically cutting off a precalculated length as the rope is used. This will advance the rope so that fresh sections will be subjected to the severe wearing conditions.

Reversing the rope involves detaching the rope from the drum and making the drum end the load end and vice versa. Rope life will be increased, however, only if the point of greatest wear is not near the midpoint of the rope.

Do you have any tricks of the trade tucked away with your foundry experience? Why not release them to fellow foundrymen? FOUNDRY will pay a minimum of $15 for each idea submitted and published. Send a photo or drawing with your idea

Taylor Zircon Prolongs Ladle Life...

produces cleaner metal too

Taylor Zircon No. 717 Ramming Mix is a most effective lining for ladles handling various types of iron and steel. A St. Louis foundry uses No. 717 exclusively for receiving and pouring ladles in their stainless steel and high alloy operations. They call it the best lining material they have ever used, because:

Photo shows the condition of a Taylor Zircon No. 717 lining of a 500-lb. ladle after 80 days' service in an Indiana foundry. At this plant, one ladle for cast iron and one for steel were lined with Taylor Zircon on the same day. The iron ladle was in service for 205 days; the steel ladle for 119 days . . . both with minor patching. Eight iron heats or six steel heats are melted here in a nine-hour day. How does this compare with your ladle lining life?

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AMERICAN DIE CASTING INSTITUTE

Sees Good Business Ahead

By KENNETH L. MOUNTAIN
Associate Editor

ABOUT 400 members and guests attended the annual meeting of the American Die Casting Institute at the Edgewater Beach Hotel, Chicago, Sept. 17-20. Officials of the institute—the national association of the job-shop diecasting industry—reflected a general feeling of optimism regarding the present and future levels of diecasting activity.

Latest figures released by the institute reveal that 1957 will see a new high in aluminum diecasting consumption. A total consumption of 192,500 tons of aluminum diecastings, representing an increase of 9000 tons, or 4.9 per cent, above the 1956 all-time high is expected. Coupled with alloying needs of 14,500 tons of aluminum for production of zinc diecastings, a total consumption of 217,000 tons of aluminum for all diecasting purposes is estimated.

Total consumption of zinc for diecastings for 1957 is expected to equal the 1956 total of 362,500 tons.

In view of reports of widespread use of diecastings in the styling of 1958 model automobiles, including the already announced Edsel, together with increased use of diecast components for home appliances and business machines, an increase in total diecasting consumption is anticipated. Forecasts indicate that 1958 will see another new high for aluminum diecasting production, with zinc diecasting second only to the 410,000 tons consumed in 1955. Magnesium and brass also are headed for top level production years.

Clifford J. Sheehan, eastern sales manager, Die Casting Division, Aluminum Co. of America, Garwood, N. J., was re-elected president of the ADCI for the 1958 term. Clifford L. Anthony, works manager, the Hoover Co., North Canton, Ohio, was re-elected vice president. David Laine and W. J. Parker were re-elected secretary and treasurer, respectively.

In addition to a director-at-large, each of the four ADCI regional groups elected a director to the national board as follows: Eastern Regional Group, W. G. Newton Jr., president, Newton-New Haven Co., New Haven, Conn.; Central Regional Group, Mr. Anthony; Midwestern Regional Group, Walter E. Brown, executive vice president, Kiowa Corp., Marshalltown, Iowa; Pacific Coast Regional Group, Gene Woods, Aluminum Die Casting Co., Los Angeles, Calif., and director-at-large, Mathew M. Berman, president, L. E. Mason Co., Boston, Mass.

Newly elected chairmen of the four regional groups: Eastern, Alfred Schneier Jr., vice president, Advance Pressure Castings Inc.; Central, Robert I. Kopper, executive assistant, Monarch Aluminum Co., Cleveland; Midwestern, Mr. Brown, and Pacific Coast, Paul T. Harlow, president, Rangers Die Casting Co., Lynwood, Calif.

The first day's sessions were devoted to a discussion of the diverse activities of the institute's Die Casting Research Foundation and its continuing efforts to provide fundamental, scientific knowledge to increase the long-range scope of diecasting production. The research shows major progress in acquiring knowledge of the mechanism of heat-checking in dies which will lead to the economic

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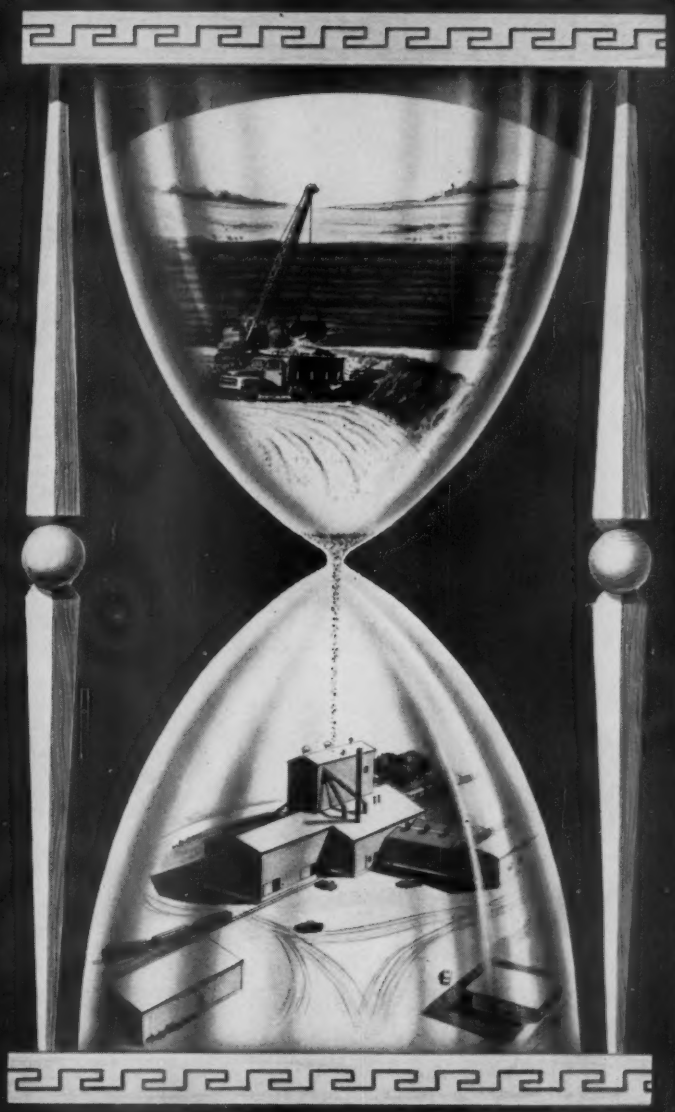
TIME WILL TELL...



SUPPLY...

should have an important bearing on any foundry's decision to standardize with one bentonite brand. Any abrupt change in the clay's characteristics due to depletion of the supplier's original reserves can needlessly disrupt casting operations in the future.

More than 200,000 tons of the finest collodial bentonite, YELLOWSTONE, are stockpiled at Magcobar's Greybull, Wyoming, facilities, along with more than 20,000,000 tons of the purest known western bentonite ore in reserve. The world's largest mine — the world's largest reserves!

DEMAND...

for Magcobar's YELLOWSTONE continues to increase as more and more progressive foundries discover that up to ten percent less of this pure, uniform clay is required. Uniform green strength, tensile strength and permeability are controlled at the plant to assure consistent specifications.

The next time you order bentonite, demand YELLOWSTONE Bentonite — your guarantee of dependable supply and uniform quality. Write for technical bulletins numbers 1 and 2 entitled "Bentonite Evaluation" and "Bentonite and the Muller."

YELLOWSTONE
BENTONITE

MAGNET COVE BARIUM CORPORATION

Des Plaines, Illinois, 576 Northwest Highway
Houston, Texas, P. O. Box 6504
Greybull, Wyoming

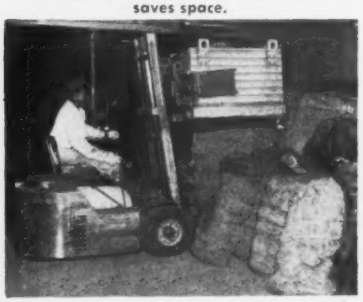
Circle 675 on Page 51→

SMELTER EFFECTS 91% MAN-HOUR SAVINGS UNLOADING SCRAP USING HYSTER LOAD-GRAB® CLAMP

Feeding a 600 lb. bale of copper shavings to a furnace.

Double decking drums filled with 2000 lbs. of brass ingots.

Stacking bales of yellow brass scrap saves space.



Using vertical storage space for a metal skip containing 1500 lbs. of scrap copper.

CHICAGO, ILLINOIS — Elesco Smelting Company has effected sizable cost reductions in their materials handling procedures by use of Hyster Lift Trucks and Load-Grab attachments. Where by former methods three men worked 8 hours (24 man-hours) to unload a car of scrap, now the lift truck and driver do the same job in 2 hours (2 man-hours)...a saving of 22 man-hours (or 91%).

Loading a trailer with ingots formerly required 3 men working 2 hours (6 man-hours); now the same men, using a Hyster Lift Truck get the same work done in 30 minutes (1½ man-hours)...a saving of 4½ man-hours (or 75%).

Both the 2000-lb. and 4000-lb. pneumatic tire Hyster Lift Trucks are kept busy throughout the day on all types of handling jobs. At night, when the furnaces are charged, both lift trucks are kept busy hauling scrap to the furnaces.

Other Hyster® Lift Truck procedures: unloading ferrous scrap metals, storing containers, feeding bales to furnaces, emptying slag pots, loading trucks with finished ingots.

Company officers state that considerable overall savings are achieved by Hyster methods as a result of better utilization of labor, time and space. Your Hyster Dealer makes it his business to keep up with materials handling progress in smelters and foundries. Call him today. He will help you to analyze and increase efficiency of your handling procedures.

Dumping a 4000 lb. slag pot.

Call your Hyster Dealer today. He is listed in your telephone directory under "Trucks-Industrial"

HYSTER COMPANY

Hyster Industrial Trucks Increase Profits for Foundries

2902-30 N. E. Clackamas..Portland 8, Oregon
1010-30 Myers Street.....Danville, Illinois
Hyster N.V. .....Nijmegen, The Netherlands
FACTORIES: Portland, Oregon; Danville, Illinois; Peoria, Illinois; Nijmegen, The Netherlands

diecasting of high melting point metals such as brass, and ultimately the ferrous metals.

The Thursday morning session was devoted to business matters, in addition to the annual reviews from officers, reports from regional groups, reports from the engineering, metallurgical, and safety committees, and an analysis of developments in metalworking industries.

At the Thursday afternoon session, Delmar Dague, Hoover Co., North Canton, Ohio, discussed "Quality Control at the Hoover Co.," and outlined the basic philosophy of its statistical quality control program. (See FOUNDRY, June 1957, Page 100.)

Gustav A. Nyselius, Mt. Vernon Die Casting Co., Mt. Vernon, N. Y., presented a talk on "Unit Dies—A Basic System for the Custom Die Caster." He provided an interesting insight into his company's use of unit dies in producing as many as four separate and distinct castings weighing up to 4 oz each from the same shot. The system, of Mr. Nyselius' design, is completely automatic, including the melting, casting removal, trimming, and return of gates to melting furnaces.

A diecasting clinic exhibit was staged to demonstrate the type of clinic that has been conducted successfully by the institute's eastern regional group. Participating in the clinic were Richard E. Kellers, ADCI; Harry J. Marcks, C. M. Grey Industries; Gordon C. Curry, Precision Castings Co.; William A. Feil, Aluminum Co. of America; Phillip Dollin, Dollin Corp.; Lewis P. Held, Mt. Vernon Die Casting Co., and Alfred Schneier Jr., Advance Pressure Castings Inc.

At the annual banquet, the annual Doehler Award, highest honor of the industry, was presented to James N. Smith, Aluminum Co. of America. The award, consisting of a plaque, a certificate, and a cash honorarium, was presented by F. W. Burgie, Doehler-Jarvis Division, National Lead Co., representing the ADCI board of directors. Mr. Smith was largely responsible for the establishment of the ADCI engineering standards and the complete program for product standards.

The meeting closed with a talk by J. J. Herbert, consultant, covering the technical aspects of transient ingredients in metal alloying.

Acquires Adelson-Werts Inc.

Air Reduction Sales Co., a division of Air Reduction Co., New York, has acquired Adelson-Werts Inc., Hartford, Conn. The Hartford firm has been an authorized dealer for Air Reduction since 1948.

Greybull, Wyoming

Caught in the middle?

If HIGH CLEANING ROOM COSTS have you caught in the middle and you don't know which way to turn, switch to CINCINNATI (PD)° SNAGGING WHEELS, the greatest grinding development in years.

You'll see for yourself why our customers are so outspoken in their praise of CINCINNATI (PD) SNAGGING WHEELS for fast, easy cutting action. Our customers also report that POSITIVE DUPLICATION (PD) means another saving. "On grade" with a CINCINNATI (PD) WHEEL means all future (PD) WHEELS will act and grind exactly alike.

CINCINNATI (PD) WHEELS are made in vitrified and resinoid bonds for both ferrous and nonferrous foundries and are available in a complete variety of sizes and shapes. *And these better, cost-cutting* (PD) SNAGGING WHEELS *are priced no higher than ordinary wheels.*

So, if you want to stop leading a dog's life take your snagging wheel problems to your CINCINNATI Grinding Wheels Distributor. Or contact us direct. Write, wire or telephone Sales Manager, Cincinnati Milling Products Division, Cincinnati 9, Ohio.

Remember—*only* CINCINNATI Grinding Wheels give you . . .

(PD) POSITIVE DUPLICATION

A PRODUCTION-PROVED PRODUCT OF THE CINCINNATI MILLING MACHINE CO.

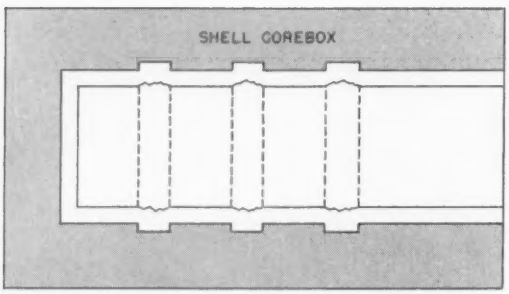
°Trade Mark Reg. U.S. Pat. Off.

CINCINNATI *Grinding Wheels*

Circle 677 on Page 51

Trouble Shooting

By C. W. AMMEN



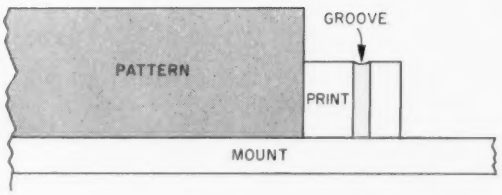


Fig. 1 (left)—Shell core in corebox. Fig. 2 (above)—Groove around core print, back of casting, is used by many shops to give good seal and prevent runout

Shell Coremaking

Dear Charlie:

Recently, I received a job to make some special 80-10-10 castings. They are similar to a bushing, except that a series of rings is cast in the bore. The core equipment consists of a shell corebox, closed on one end and parted lengthwise through the center. The only critical dimensions are in the bore, which must be to a close tolerance with very fine finish. Thus the use of a hollow shell core. A friend of mine who has a suitable machine and uses some shell cores in his operation, which is nodular, made several cores for me. He uses a premixed or precoated sand, which he purchases.

I have had no degree of success so far—cores crack or fill up with metal, lead sweats in the bore, etc. Perhaps the sand mix used for ferrous shell cores is not suited for brass and bronzes? I would like to mix my own sand and buy a shell coremaking machine of my own because it looks as though shell cores would be applicable to lots of castings. How about it? The casting in question is on a board and is 13 in. long with 6 in. OD and 5 in. ID between rings. It is cast horizontally.

Sincerely,
Sam

Dear Sam:

Yes, shell cores are, like shell molding, becoming more and more popular for certain types of work. Shell cores are coming to the front very rapidly. One of the most important things to consider in designing with a shell core in mind is to use it when it offers a definite advantage over an existing dry or green sand core.

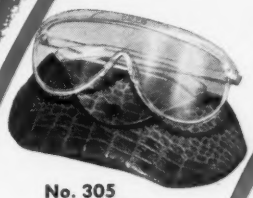
Carefully consider the casting, its design, etc., to determine whether a decided advantage can be realized by use of a shell core—an over-all reduction in cost, less machining, elimination of an operation, etc. You know what I mean, old boy. Don't use a shell core to core out something like the hole in a frying pan handle or some such foolishness as that. Sometimes a combination of shell and dry sand cores in the same job is the best practice. Use your noodle; use the methods and types of materials you have to the best advantage. Avoid foolish or ridiculous application or misuse. Speaking of the latter, I have seen some real lulus; but I also have seen some very ingenious applications of shell cores which resulted in concrete advantages and dollar savings.

So far as I know, there is no difference in the sand, binder, or method employed to make a shell core for use in nodular or any other type of metal, ferrous or nonferrous. I have seen shell cores used to make a gray iron casting, then used to produce the same job in brass with no change in equipment or cores. It is my understanding, however, that the most difficult metals to cast in conjunction with shell cores are some classes of steel and the copper-base alloys with more than 6 per cent lead in their makeup.

A shell core such as yours has a tendency to be thin at the vertical surfaces which are at right angles to the body—that is, the sides of the core that forms the sides of your rings. However, in your case, with the ½-in. wall in the casting, the ring projections on the core undoubtedly will fill up completely with sand and be solid, as shown in Fig. 1. Using a thin, hollow, shell core over a long unsupported span, completely surrounded by metal, is like trying to duck a balloon under water. Since you have no core rods or other stiffening or supporting members, the lifting force on the core is somewhat greater because of its lightness and its hollowness. I have seen shell cores reinforced internally with molding sand or just plain dry, sharp sand.

The print on the open or dump

CESCO...RIGHT—BEFORE YOUR EYES!



No. 305
LITE-SPEC

Now CESCO gives you style, comfort and safety in NEW Plastic and Metal Frame glasses

No. 255
LITE-KLIPS

Smart styling combined with practical on-the-job utility are the features both you and your employees will like about these new open-type safety glasses by CESCO. Combination plastic and metal frame gives the appearance of attractive personal glasses, yet provides a durable, long-wearing frame in which lenses can easily be replaced. Result: glasses last longer, save you money.

All-in-one plastic section forms partial lens rim and comfort bridge pad—affords full closure at nose section to keep out foreign bodies. Plastic is unaffected by skin oils or cleaning agents. Other features include:

No. 562
COVERLITE
goggles

AVAILABLE IN 2 SIZES • 46x39 mm (No. 326)
48x41 mm (No. 328)

SHAPE OF LENS • F-7 in clear and anti-glare safety glass and Cescolite plastic

FOUR BRIDGE SIZES • 20, 22, 24 and 26 mm

No. 565
flexible plastic
goggles

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ASK your CESCO Safety Equipment Distributor to show you these new plastic and metal frame safety glasses and the many other safety glasses and goggles in the CESCO line

CESCO CESCO **FOR SAFETY**

It's interchangeable 3 ways!

HOPPER BODY — At exceptionally low cost you can mechanize material-handling with this one basic unit and easily-changed attachments. For example — as a power wheelbarrow, Kwik-Mix S-10 Moto-Bug carries 1500 lbs. of bulk materials in 10 cu. ft., gravity-dump hopper. It climbs 16% ramps or grades fully loaded, turns in 61-inch radius, clears 33-inch aisles, doorways—works inside warehouses, box cars, elevators. (15 cu. ft. hopper body optional.)

PLATFORM — Change from hopper body to 32-inch x 4-foot platform, and you have a heavy-duty, ¾-ton truck. Flat-bed platform tilts for easy pull-away when unloading. Sturdy, all-welded, steel bed is rib-reinforced — has stake pockets for sideboards.

FORK LIFT attachment on S-10 Moto-Bug has 1000-lb. capacity (at 15-in. load center), and 6-foot lifting height. Forks are 20 or 30 inches long, adjustable 6 to 32 inches wide. Tilting mast optional. Big R-15 Moto-Bug also is available with special attachments. See Kwik-Mix distributor, or write us today.

KWIK-MIX Company, Port Washington, Wis.

Send us free copy of new Moto-Bug catalog.

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KWIK-MIX MOTO-BUG® (Koehring Subsidiary)

end of your core should be long enough to insure a good seal to prevent metal from bleeding or running into the core. Most shops using shell cores cut a groove around the core prints, a little way back from the casting, as Fig. 2 illustrates. This procedure will give you a little green sand crush to form a tight seal around the core print. Dough roll, core paste, or one of the prepared seals with a little corn flour sprinkled on makes a good seal.

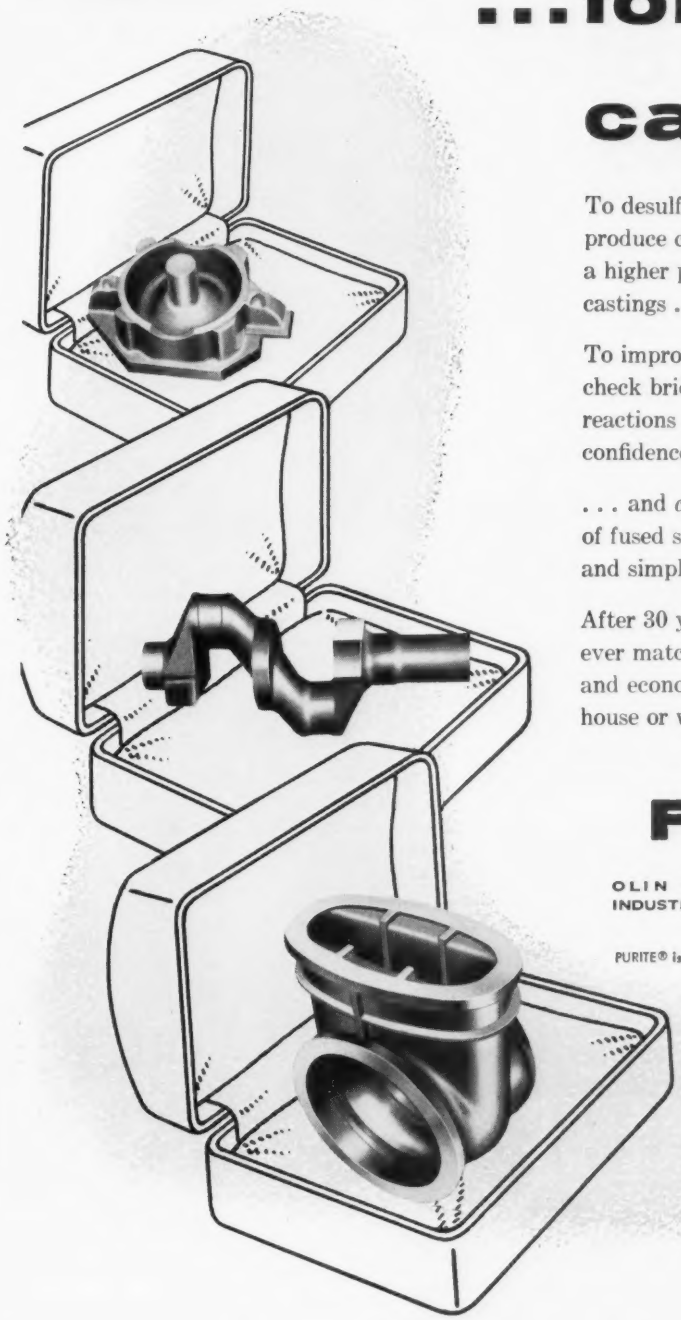
The percentage of resin needed in the mix seems to vary from sand to sand, increasing with sand fineness. The usual amount is about 5 per cent by weight, but there is a critical amount which must be worked out. As the amount of resin is increased, the resulting shell or core becomes smoother and harder. It is with this condition that you might run into penetration, cracks, etc. A high percentage of resin makes a hard and brittle core. It seems that above 8 per cent resin, cores are too hard and brittle, and below 4 per cent they usually are too weak. I believe that the proper ratio of sand to binder will produce the desired results.

The sand and resin may be mixed dry in a suitable muller or a Y-type blender and used in that condition, or the sand may be resin coated. Sand may be coated with resin by either the hot or the cold process. Since the latter can be carried out easily in the small shop, I will touch on it briefly. Sand and the proper amount of resin—about 2.5 lb per 100 with round grain and 4 lb with subangular sand—are mixed dry in a muller for 1 to 2 minutes; then an alcohol-water solvent is added slowly. The solvent is 3 parts denatured ethyl or isopropyl alcohol to 1 part water by weight. The amount varies with resin, and is 0.72 lb solvent for the 2.5-lb resin mix and 1 lb solvent for the 4-lb resin mix.

Mulling is continued for 10 to 20 minutes until the solvent has evaporated and the sand is dry. That condition is indicated by appearance and can be checked by picking up a handful of the sand, which should show no strength. Mulling is stopped as soon as the sand mix is dry. If you try this, don't forget that the muller should be hooded and hitched to an exhaust system—or you might not be around to ask any more questions.

This mixture is designed to coat every grain with a coating or shell of resin, preventing the possibility of segregation which sometime occurs in sand resin mixes. Any resin which is capable of heat polymeriza-

...for quality castings



To desulfurize iron to uniform specifications . . . to produce clean, quiet-pouring metal . . . to insure a higher percentage of strong, machinable castings . . . *count on* Purite.

To improve melting operations in the cupola, to check bridging, increase fluidity, speed combustion reactions . . . to permit use of high sulfur scrap with confidence . . . *count on* Purite.

. . . and *count out* Purite by the pig! The 2-pound pigs of fused soda ash eliminate weighing or measuring and simplify storage operations.

After 30 years of profitable performance, nothing has ever matched Purite for convenience, effectiveness and economy. Check your foundry supply house or write—

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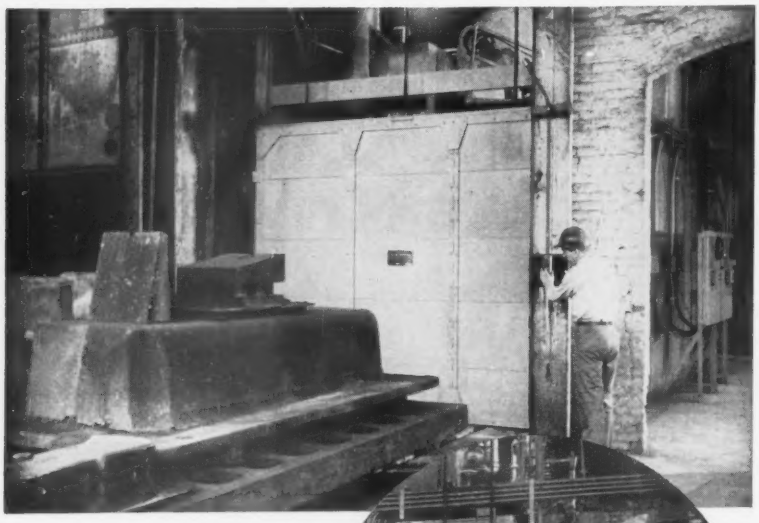
here's another **carl mayer** installation...

Cutting Costs for its Owner



CAR TYPE CORE AND MOLD OVEN

Above—A difficult engineering and installation problem solved by Carl Mayer because the oven filled this space completely. This modern oven, with patented down draft heating system and motor operated lift door, replaced an obsolete brick oven.

RACK TYPE CORE OVEN

Right—Installed at rear of mold oven to form an efficient, flexible combination. Miscellaneous cores are uniformly baked with modern, automatic controls. Operation is efficient and economical.

Carl Mayer's outstanding engineering and design features sold the steel mill where these ovens are now in operation. They incorporate the exclusive Carl Mayer recirculating heating system and special triple slotted panel construction.

Heat loss is reduced up to 1/3, and fuel savings up to 50% over old conventional methods are possible. Temperature uniformity is guaranteed.

Consult Carl Mayer now for any type foundry oven or furnace, large or small, and for any purpose. Write for Bulletin 53-CM.

THE **carl mayer** CORP.

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OTHER PRODUCTS: Heat Treating Ovens and Furnaces • Rod Bakers • Welding Rod Ovens • Paint and Ceramic Drying Ovens • Special Processing Equipment and Accessories

tion can be used, such as urea formaldehyde, phenol formaldehye, or the like. Use a top-quality, washed and graded, subangular silica, preferably clayfree, but at any rate below 2 per cent clay AFS.

No doubt you know by now that, as with any process, regardless of what one is up to, each factor involved must be understood and properly applied. Sand, resin, mixing, blowing, curing, cavity temperature, and all the rest of the items involved must be carried out properly.

I contacted a friend of mine who makes some 80-10-10 bushings with shell cores, and he says that the trick is not to undercure or overcure the shell. This can be accomplished only by experimenting. He goes a great deal by the appearance or color. With high-lead alloys, he has reduced sweat and penetration by spraying the hot cores with sulfite water. Dry plumbago rubbed on the surface of the core also is beneficial.

Sincerely,
Charlie

Book Review

Fasteners Handbook, by Julius Soled, cloth, 6 x 9 in., 430 pages, published by Reinhold Publishing Corp., 430 Park Ave., New York 22, N. Y. Price $12.50.

Comprehensive coverage of fasteners provides up-to-date answers to fastening problems in all fields. Illustrations and descriptions provide detailed information on all fasteners, standard and proprietary, available from all manufacturers. These include specialized fasteners developed during World War II, fasteners that increase structural safety and reliability and the whole range of sizes and type of materials available.

"Nothing doing! You want a blower motor for your hobby foundry? Go BUY one!"

Circle 681 on Page 51

Circle 682 on Page 51→

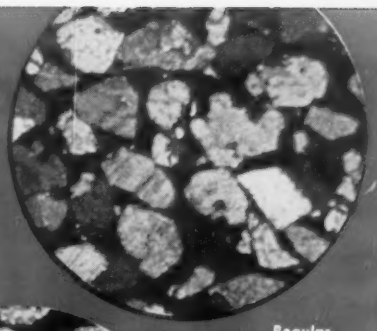
NEW in toughness

NEW in cutting action

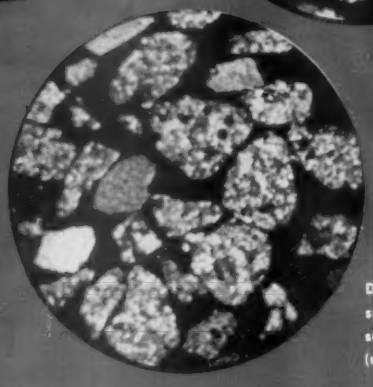
NEW in grinding economy

NEW LIFE

for more grinding...



Regular Aluminum Oxide (unretouched)



DA Borolon smaller crystal structure (unretouched)

NEW

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DA Borolon®

TRADE MARK

for resinoid bonded snagging wheels

A big forward step to new efficiency in grinding steel mill billets and foundry castings. Note the smaller crystalline structure of DA Borolon within each abrasive cutting particle! This means inherent toughness to resist fracture during grinding stress . . . more and sharper cutting edges on the wheel face . . . longer, useful wheel life . . . and more production per wheel dollar. Test after test on swing frames, floor stands and portables prove that Simonds wheels with this new aluminum oxide abrasive belong on your grinders for more production at lower cost. Write for descriptive bulletin.

CALL YOUR SIMONDS DISTRIBUTOR

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MALLEABLE FOUNDERS HOLD FALL MEETING

Annual fall meeting of the Malleable Founders' Society had marketing and technical subjects on its discussion program. Held at Hotel Cleveland, Cleveland, Sept. 20, the meeting was presided over by President P. C. DeBruyne, Moline Malleable Iron Co., St. Charles, Ill.

Operation of the marketing program employed by the Foundry Dept. of General Electric Co. was explained by G. J. Cook, its marketing manager. He pointed out that engineers want more information on castings, and if they receive it they can be expected to specify cast parts in increasing volume. An effective way to disseminate this information is by a seminar such as the one GE conducted last May (see August FOUNDRY, Page 128).

This seminar was the outgrowth of the good response by company engineers to a questionnaire asking them to list the subjects pertaining to castings on which they desired more information. The 450 replies that were received sought information on such subjects as design, physical properties probable tolerance, and adaptability of castings.

Attendance of more than 500 at the seminar far exceeded expectations. Talks presented discussed foundry materials and methods, four papers on casting design, and examples of how costs can be reduced by conversions to castings. Demonstrations of foundry practices attracted unusual interest. Numerous inquiries received after the seminar testified to its effectiveness.

Mr. Cook said that, to be successful, such seminars should be part of a well-rounded marketing program. He also suggested that any foundry which does not think it can handle a seminar by itself might join with other foundries in promoting one.

A preliminary report on the Malleable Founders' Society's study of machinability was presented by L. C. Marshall, director of research, Link-Belt Co. Physical Research Laboratory, Indianapolis, and chairman of a subcommittee conducting the study. Highlighting the report was a high-speed movie of machining operations at Purdue University where the investigations are being conducted on malleable iron, steel, gray iron, nodular iron, and manganese bronze castings. Equipment used permits measuring the stresses set up in the cutting tool. The study indicates that hardness of the part being machined has little effect on the horsepower required. Oxide tools show an advantage over carbide tools in horsepower required per cubic inch of metal removed per minute and have comparable life.

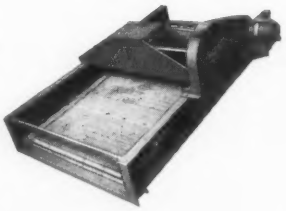
Subsequent work will study tool geometry to determine best design for maximum cutting efficiency and tool life.

For Efficient Sizing

Foundry sands are cleaned and re-sized accurately and economically with the Concenco® Hydraulic Classifier. Sands are sorted into as many sizes as there are cells in the classifier—then are recombined according to your own specifications. Extremely fine or burned particles are removed as a slime overflow. There are no moving parts. Operation is by hydraulic water only, easily regulated for most efficient sizing.

For Screening Economy

The Leahy® Screen with the FlexElex® heated jacket is an exceptionally useful screen to have when difficult or damp sands must be screened. For ordinary screening, the standard Leahy Screen is unexcelled. It is especially efficient in the fine mesh range. Send for full information.



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CONCENCO PRODUCTS

★ *The ORIGINAL Deister Company* ★ *Inc. 1906*

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"Hello, Ace Foundry? About that flour you borrowed from us a month ago . . ."

How planned test procedures

improve foundry profits

To expand the market for castings, foundrymen gain by impressing their customers with the importance of better designs and realistic specifications. If this is done at the outset, your own profit and your customer's continuing satisfaction are assured.

Establish practical design standards

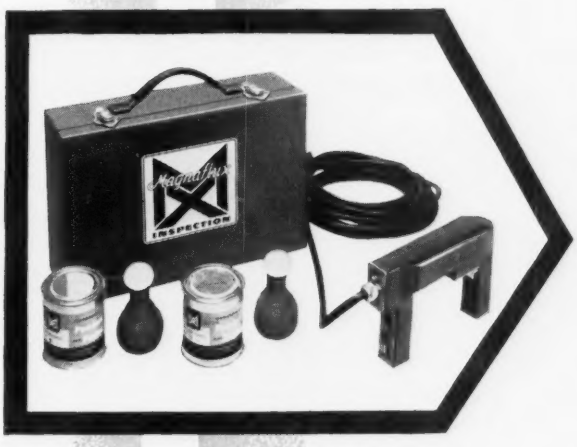
Determine, if possible, the true service requirements and practical characteristics your customer needs. Mutually establish a standard which satisfies the need at a reasonable cost. A good design must be satisfactory functionally, structurally and foundry-wise.

Good design insures trouble-free foundry practice, profitable operation and customer satisfaction. Castings with even stress flow are more serviceable and are easier to pour. Experimental stress analysis with Ⓜ Stresscoat brittle coatings lets you make design changes without guesswork or wasted effort. Design for service, easy casting and high profits.

Keep your finger on the pulse of production

Ⓜ Magnaglo (Ⓜ Zyglo for non-ferrous) is recommended as a "finger on the pulse" means of determining the causes of any cracking in the foundry. Simple tests immediately after shakeout or cleaning can locate cracks when they first occur. This permits you to take corrective action, no matter what the cause. With sampling inspection you actually control the quality of the entire run as it is being poured. You do not waste time and profits in handling, heat treating, finishing, or machining, intermittent lots of cracked castings. It all adds up to better products for the customers and higher profits for the foundry!

Write for details on how Magnaflux nondestructive testing methods can be employed to increase the yield of usable castings and foundry profits. No obligation, of course!



Lightweight Magnetic Particle

Y-5 YOKE KIT

Provides Portable Inspection

Uniform quality castings are far more important to foundry profits and customers than perfection. For this reason, many gray iron foundries have adopted the Y-5 Yoke Kit for magnetic particle inspection at stages of "in-process" operations. The Y-5 is easy-to-use, fast, light-weight, portable and *low cost!* It reliably detects handling cracks, hot tears and similar defects open to the surface. The Y-5 is a convenient and inexpensive means of checking pilot runs for cracks, or for inspecting local areas of castings after cleaning, machining, etc.

COMPLETE KIT ONLY **$195.00**

F.O.B. Chicago, Ill.

THE HALLMARK OF QUALITY IN NONDESTRUCTIVE TEST SYSTEMS

Take Your Inspection Problems to the House of Answers . . .

MAGNAFLUX CORPORATION

7350 W. Lawrence Avenue • Chicago 31, Illinois

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Circle 684 on Page 51

FOUNDRYMEN WHO KNOW

QUICK—
ACCURATE
Temperature Readings
in Non-ferrous
Molten Metals with

XACTEMP
Trade Mark Reg. U. S. Pat. Off.
HAND PYROMETERS

Accurate to Within a Fraction of a Scale Division

The XACTEMP PYROMETER makes possible better quality control and helps toward elimination of blowholes, burnouts, sand infiltration and other flaws due to incorrect temperature . . . affords a simple, effective means for accurate temperature measurement of molten, non-ferrous metals. Well-balanced, easy to handle . . . always ready for use and requires no preliminary adjustments.

Cast aluminum and brass construction. Indicator is of medium resistance not affected by thermocouple length . . . acts rapidly . . . provided with Alnico V magnet and direct reading dial starting at 50° F. 43" stainless steel extension . . . standard 7" Marshall tip permits true readings below surface of metal. Made to give good service for years. Order at once to be sure of immediate delivery from stock.

Catalog No. MM701 $68.50
Complete with Thermocouple . .

Catalog No. 1449-501T Replacement
Thermocouple Tip $7.60

Ask about XACTEMP PYROMETERS for all-around general temperature checking. A full line of thermocouples available in stock.

5551

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CLAUD S. GORDON CO.
Manufacturers & Distributors
Thermocouple Supplies • Industrial Furnaces & Ovens
Pyrometers & Controls • Metallurgical Testing Machines
607 West 30th Street, Chicago 16, Illinois
2027 Hamilton Avenue, Cleveland 14, Ohio

Circle 685 on Page 51

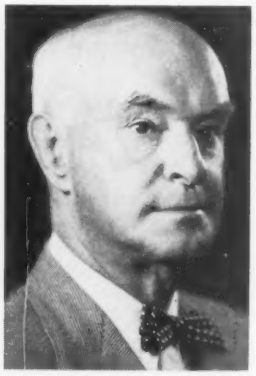
Obituary

JOHN T. LLEWELLYN, 94, former chairman of the board, Chicago Malleable Castings Co., and its affiliate Allied Steel Castings Co., Chicago, died Sept. 16. A native of Wales, he was brought to the United States as a child and attended Mil-

JOHN T. LLEWELLYN

waukee schools. He organized Belleview Malleable Co., Racine, Wis., in 1892, and about 1910 with his two brothers acquired Chicago Malleable. In 1918 Allied Steel Castings Co. was purchased for production of steel castings for railroad use. Mr. Llewellyn served as president of both companies prior to becoming chairman.

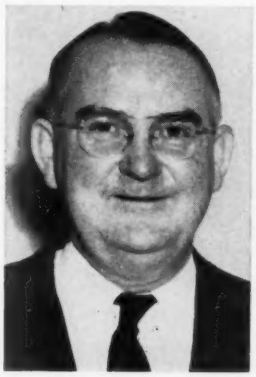
Franklin R. Hoadley, 67, retired president, Farrel-Birmingham Co., Ansonia, Conn., died Sept. 12. Following graduation from Yale University he became a coremaker apprentice with Farrel Foundry & Machine



FRANKLIN R. HOADLEY

Co. His father and grandfather had been associated with the company. When it was merged with Birmingham Iron Foundry Co. in 1927, Mr. Hoadley was made manager of foundries. He resigned as vice president in 1937 to become president-treasurer, Atwood Machine Co., Stonington, Conn., and was named president of Farrel - Birmingham when it acquired Atwood Machine in 1945. Mr. Hoadley served as president of both the Gray Iron Founders' Society and National Foundry Association.

William H. Mason, 58, general superintendent and assistant to the president, Allyne-Ryan Foundry Co., Cleveland, died Sept. 9. Associated with the company for 40 years, Mr. Mason started as a patternmaker



WILLIAM H. MASON

and prior to becoming superintendent of the foundry, was foreman of the pattern shop.

Harold S. Falk, 73, since 1940 president, Falk Corp., Milwaukee, died Oct. 7. He spent summer vacations in various departments of the company while attending University of Wisconsin, and following graduation in 1906 he entered the maintenance department. Later he became assistant superintendent of the foundry, foundry superintendent, general superintendent of the entire plant, and in 1922 was named vice president and works manager. Mr. Falk was widely known for the part he played in the apprenticeship movement throughout the country, and in 1939 was awarded the John A. Penton gold medal of the American Foundrymen's Society for his leadership in apprenticeship training.

Robert M. Shumway, 79, senior partner, C. W. Shumway & Sons, Batavia, Ill., died Sept. 29 in Raton, N. Mex.

Circle 686 on Page 51→

FOUNDRYMEN WHO KNOW

PREFER DEMMLER CORE SHOOTERS

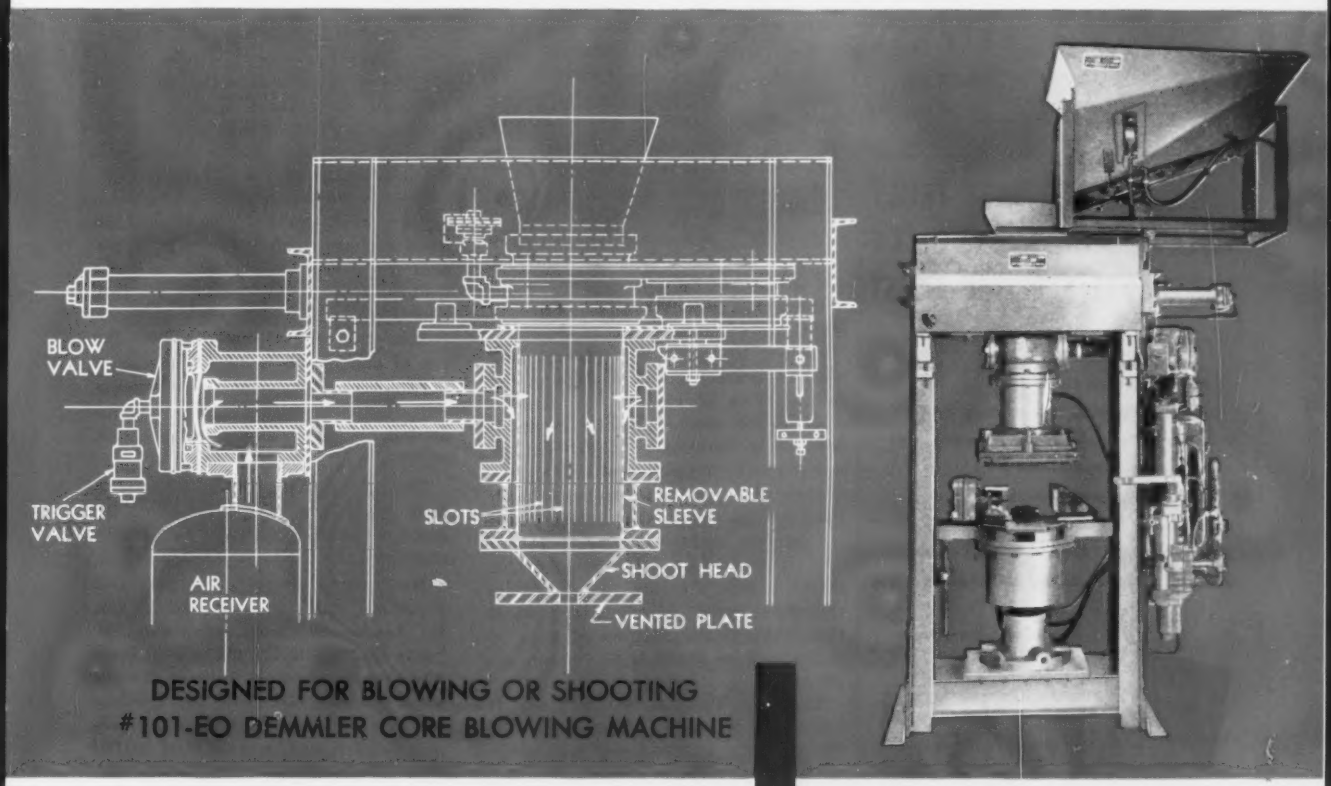
One of America's leading steel foundries conducted an unbiased 60 day test under identical conditions to determine whether they would standardize on a foreign made core shooter or the Demmler 103-EO. Results proved Demmler FIRST in all tests:

FIRST in core blowing
FIRST in core shooting
FIRST in highest production

ONE MACHINE DOES BOTH . . . BLOWS OR SHOOTS CORES

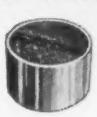
Complete information on this superior line of equipment available on request.

DEMMLER FIRST NAME IN CORE BLOWERS



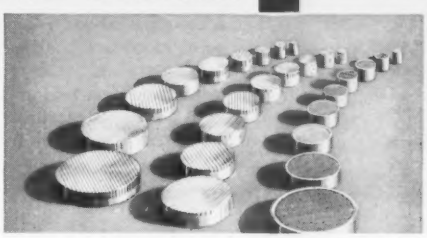
DESIGNED FOR BLOWING OR SHOOTING
#101-EO DEMMLER CORE BLOWING MACHINE

DEMMLER MANUFACTURING COMPANY — **KEWANEE, ILLINOIS**



HL 150 MESH VENTS

A new general purpose vent which practically eliminates the cleaning coarser screens demand. Write for literature on Demmler vents.



PRECISION CORE BOX VENTS

Demmler is by-far your best source for precision core box vents, manufactured by specialists who pioneered in the core blower industry. Many sizes, slot widths and screen meshes are available in brass and steel core box vents.

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Circle 688 on Page 51

NONFERROUS FOUNDERS MEET IN ST. LOUIS

Discuss Foundry Costs and Molding Methods

By ROBERT H. HERRMANN
Associate Editor

PRINCIPLES involved in pricing castings, plus a discussion of special molding processes, featured the Non-Ferrous Founders' Society Management and Operating Conference at the Coronado Hotel, St. Louis, Sept. 25. P. E. Lankford, East Birmingham Bronze Foundry Co., Birmingham, and first vice president of the national society, presided at the meeting attended by foundry management men from several states.

Society President C. J. Egetter, Crown Brass Mfg. Co., Alhambra, Calif., opened the meeting with a talk on **Advantages of Being a Member of NFFS.** In addition to receiving standard society services, foundrymen may get many worthwhile ideas from technical session speakers and from shop talk discussion in bull sessions which always take place whenever a group of foundrymen gets together.

Pricing in a Changing Economy, by Dr. Joseph P. McKenna, director, Department of Economics, St. Louis University. A pricing policy should be based on a systematic approach, taking into account supply and demand, business conditions, and other current circumstances. A single markup should not be used on all jobs. It should vary according to intricacy of the casting, competition, demand, and other factors.

What Happens When the Price of Metal Goes Up? by A. J. Messmer, Messmer Brass Co., St. Louis, and national society director. Raising the selling price of castings an amount equal to the increase in cost of metal results in decreased profit to the foundryman. Proper accounting procedures show that the cost of producing castings goes up as metal prices go up due mainly to the increased cost of recoverable and unrecoverable metal losses. Casting selling prices therefore must be increased more than the amount that metal goes up if the rate of profit is to remain unchanged.

The CO_2 Process, by William L. Leopold, Northern Bronze Corp., Philadelphia, and national society director, and William Grimm, William Grimm Bronze & Aluminum Foundry, Philadelphia, alternate director. In Mr. Leopold's foundry about 65 per cent of the cores used are made by the CO_2 process. Some trouble was encountered with cores softening in storage. The difficulty was attributed to water in the mix which froze during gassing and then melted. Drying the sand before mixing solved the problem.

Undergassing also caused some trouble because cores were green in the center. Overgassed cores never have given trouble. Difficulty in removing cores from castings was solved by adding wood flour to the mix to improve collapsibility.

Overgassing Causes Some Trouble

On the other hand, Mr. Grimm described difficulties in his shop with overgassed cores and with overmixing which results in premature setting-up of the binder. The CO_2 process is not a cure-all, and in his shop it has worked best for making the larger molds and cores.

During the question period it was pointed out that cores have been gassed successfully with high-pressure air and nitrogen.

Shell Molding, by T. K. Hutchinson, Hutchinson Foundry Products, Alton, Ill. The speaker's foundry is a 100 per cent shell mold operation producing aluminum, brass, and bronze castings weighing up to 1 lb. Subangular sands of 100-120 AFS fineness are used. The use of excess resin or of round grain sands can cause mold cracking. An addition of 2 per cent clay to the mix will improve peel-back of the mold. Wetting agents, however, reduce shell strength, reduce flowability, and require the use of more resin.

Iron patterns are best. Aluminum patterns sometimes warp and become etched by ammonia from the resins, making molds hard to draw.

Gating and tolerances for nonferrous metals ordinarily are about the same for green sand and shell molded castings.

How We Use Petro-Bond, by James F. Gilbert, Gilbert Brass Foundry Co., St. Louis, and vice chairman, St. Louis chapter. Molds made with sand, proprietary bonding agent, oil, and wood alcohol are said to produce castings with good finish, close pattern fidelity, and tolerances of ± 0.003 to 0.005 in. per in. Also, it is said that small risers can be used because castings do not cool rapidly.

Claimed disadvantages are that molds develop excessive smoke when poured and may catch on fire if castings are broken out too soon. In addition, the cost of prepared sand is high.

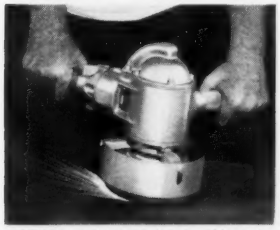
Circle 704 on Page 51→

AIRETOOL Pneumatic Grinders

powerful . . . versatile . . . easy to handle . . . economical to operate

HORIZONTAL GRINDER MODEL 700 for snagging, buffing, wire wheel work. Balanced design, easy to maneuver, weighs only 12 lbs. Wheel capacity: 6" - 8", RPM: 4500-6000, Model 600: 2½" - 6" Wheel, 9000 RPM, weighs 9 lbs.

ABRASIVE BELT ATTACHMENT for fine finishing operations on flat or contour surfaces.



VERTICAL GRINDER Model 700-V for cup wheel grinding on large surfaces, wire wheel work or flexible disc finish work. Wheel capacity 6", RPM 4500-6000, weight 11 lbs.

MIDGET DIE GRINDER Model 200 — Precision tool for intricate grinding, filing and cutting. Speed 60,000 RPM. Collet Chuck ⅛" capacity.

Airetool's new line of portable pneumatic equipment is designed for increased production, less operator fatigue and lower operating costs.

All tools are powered by Airetool's dependable pneumatic motor . . . the result of more than 27 years' experience in designing, developing and manufacturing pneumatic powered equipment. Airetool motors are smooth running . . . powerful . . . can handle the heaviest loads without stalling or heating up.

Operating parts are precision made from hardened alloy steel and an effective lubrication system prevents wear, increases motor service life.

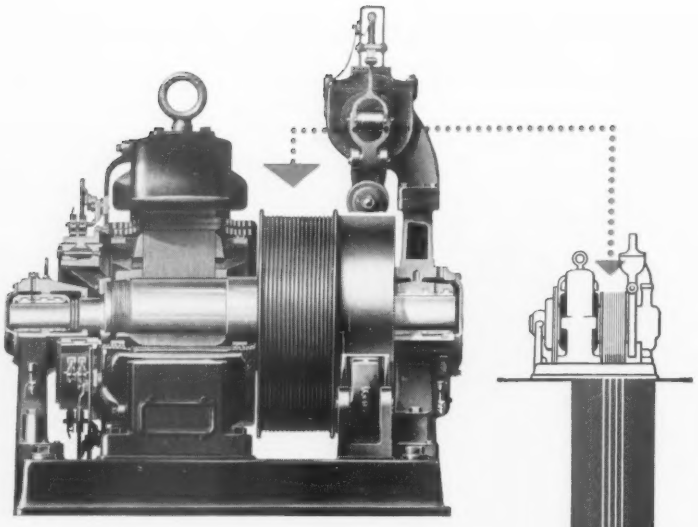
Write for the new Airetool catalog No. 63 showing the complete line of Airetool grinders, sanders, drills and accessories

New Airetool Catalog of Pneumatic Production Equipment

AIRETOOL
MANUFACTURING COMPANY
SPRINGFIELD, OHIO

BRANCH OFFICES: New York, Chicago, Tulsa, Philadelphia, Houston, Baton Rouge.
REPRESENTATIVES in principal cities of U. S., Canada, Mexico, South America, England, Europe, Puerto Rico, Italy, Japan, Hawaii.
EUROPEAN PLANT: Vlaardingen, The Netherlands
CANADIAN PLANT: 37 Spalding Drive, Brantford, Ontario

Circle 687 on Page 51



Otis Elevators Use HANNA PIG IRON

to support their ups and downs

Rough finishing a one-piece sheave rim and brake pulley casting in the Otis Elevator Company's Yonkers foundry.

Center of action in the mechanism of Otis Elevator Company's high-speed (up to 1,400 ft. per minute) Autotronic passenger elevators is the one-piece cast iron drum shown in place in the top picture and in rough form below. Half of the drum serves as a sheave rim for the elevator's cables, the other half as a brake pulley. To maintain the high standards of quality and performance demanded of these drums, Otis Elevator's foundry at Yonkers, N. Y., casts them with Hanna Pig Iron.

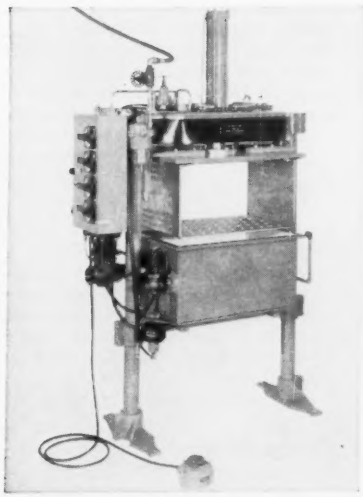
The Hanna range includes the Hanna 38-pound pig, the foundryman's favorite standard, in all grades, silvery and HannaTite, a specially controlled, close-grain iron. Also available is the HannaTen, a smaller ingot, with finer grain structure and no free carbon pockets. For prompt, expert handling of your pig iron requirements, call your Hanna representative at any time

HANNA
THE BEST KNOWN NAME IN IRON

THE HANNA FURNACE CORPORATION
Buffalo • Detroit • New York • Philadelphia
Merchant Pig Iron Division of
NATIONAL STEEL CORPORATION

FOUNDRY EQUIPMENT AND SUPPLIES DIGEST

For More Details on These Items Use Reply Card —Page 204



CO_2 GASSING MACHINE

CO_2 vacuum chamber gassing machine lends itself to production gassing of cores and molds. The multicycle machine is evacuated, pressurized, re-evacuated, and repressurized. Cores and molds are conveyorized into the machine prior to the gassing cycle. Gassing heads, injection probes, or venting are eliminated. Some of the claimed advantages are that gas consumption is reduced, cured cores are uniform, cores can be cured in the box, on driers, or after stripping, a chamber full of cores can be cured in the same cycle time as individual cores, and sand mixtures of low permeability can be gassed with ease. Made by **Alphaco Inc.,** Box 827, Reading, Pa.

For More Details Circle No. 401—Page 204

SMALL FOUNDRY

Small foundry designed for the beginner includes 32 items essential to perform melting, handling, molding, and casting operations. Books on molding and patterns are also provided. Melting unit is a high temperature burner capable of melting cast iron. The burner uses used automobile crankcase oil as a fuel and will handle No. 6, 10, and 20 crucible furnaces as melting units. Temperature can be controlled from a few hundred degrees to about 2800° F. When wide open the burner consumes about two gallons of fuel oil an hour and will melt 33 lb of cast iron in a No. 10 crucible. Mold boxes, sand, bottom boards, slick and spoon, parting dust, riddle, tongs, and a hand rammer are among the material in the package. Items, including the burner, are available separately. Made by **Ursutz Burner Co.,** Box 566, Tempe, Ariz.

For More Details Circle No. 402—Page 204

DIECASTING MACHINE

Small aluminum cold chamber diecasting machine for casting small parts has a capacity of 2½ oz per shot. It is especially adaptable to casting aluminum alloys around any small rotor for electric motors. The machine has an air-operated impact type injection system and a hand-operated toggle mechanism which opens and closes the die, allowing the operator to insert the stacked laminations into the cavity with safety. Sensitivity of the lock prevents damage to dies in event an insert slips. Eyeglass frames, toy engines, electrical fittings, and other small aluminum parts can be cast successfully by this machine. Made by **British Machines & Foundry Supplies Ltd.,** Dept. K29, Port Washington, N. Y.

For More Details Circle No. 403—Page 204

PNEUMATIC GRINDER

Model 700-V vertical pneumatic grinder can be used for cup wheel grinding, sanding or wire wheel work. Its 6-in. cup wheel, wire brush,

or sanding disc works well for taking down rough spots or over-all grinding on flat or curved surfaces. Equipped with two handles, the grinder weighs 11 lb and is balanced to grind evenly with minimum added pressure at speeds from 4500 to 6000 rpm. Grinding speed can be adjusted by a thumb control button. Various cutting surface wheels, sanding, and polishing attachments are available. Made by **Airetool Mfg. Co.,** Springfield, Ohio.

For More Details Circle No. 404—Page 204

VANADIUM OXIDE

New grade of fused vanadium oxide (V_2O_5) with a nominal purity of 98 per cent is available. Its typical analysis is 98 per cent vanadium oxide, 1 to 2 per cent alkali oxides, maximum 0.05 per cent sulfur and maximum 0.2 per cent insolubles. It

is said the low alkali-oxide content virtually will eliminate fuming problems caused by these oxides in ferrous applications. Made by **Electro Metallurgical Co., Division of Union Carbide Corp.**, 30 East 42nd St., New York 17, N. Y.

For More Details Circle No. 405—Page 204

MASONRY DRILL

Masonry drilling machine uses surface-set diamond or diamond impregnated coring bits to drill through cement block at 1 fpm or reinforced concrete aggregate at 5 to 8 minutes per ft. Unit is used to cut holes in existing floors or walls for conduit or piping. It will drill through glass, Cermets, ceramic or glazed tile, marble, granite and other materials. Units are supplied with electrical motors in speed ranges from 250 to 1000 rpm using 115 v ac/dc. Made by **Diamond Products Inc.**, 346 Prospect St., Elyria, O.

For More Details Circle No. 406—Page 204

FIRST-AID FOR BURNS

Burn Releef, a first-aid treatment for minor burns, is an aerosol spray containing Allantoin, an ingredient which stimulates healing and encourages rebuilding of new tissue. It is claimed that Burn Releef also is excellent for cuts, abrasions, and other minor surface injuries. Made by **Interstate Precision Products Corp.**, 707 East Vermont Ave., Anaheim, Calif.

For More Details Circle No. 407—Page 204

CO_2 BINDER

Paraset, a CO_2 core and mold binder, is available in three collapsibilities: 1. HC—for high temperature collapsibility. 2. General Purpose — suitable for most normal foundry operations. 3. LC—for low temperature metals. Generally, 3 to 5 per cent of Paraset by weight is added to washed and dried sand before normal mixing, blowing, ramming, and CO_2 application takes place. Made by **Para Products Division, Foundry Rubber Inc.**, 5200 River Rd., Washington 16, D. C.

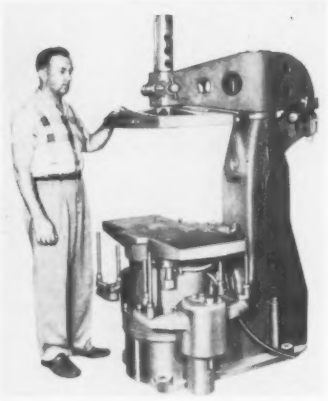
For More Details Circle No. 408—Page 204

OPTICAL PYROMETER

Optical pyrometer Model 8626-C has a temperature range to 4200° C (7600° F) for applications involving solar and vacuum-melting furnaces and certain nuclear reactions. It is sparkproof and dusttight. Made by **Leeds & Northrup Co.**, 4934 Stenton Ave., Philadelphia 44, Pa.

For More Details Circle No. 409—Page 204

Molding Machine Speeds Up Line Production



SIMULTANEOUS squeeze-jolt machine molds copes and drags singly or in combination. The 350, as it is called, permits stepped-up conveyor line production and handles flask sizes up to 20 x 30 in., or a cope and drag combination each 15 x 20 in. It can be furnished with manual or automatic control. Roll-on, roll-off conveyor is available, and other auxiliary flask handling equipment can be engineered to requirements.

A 530-lb anvil produces a blow while the squeeze is on. Because of a shockless jolt feature, the machine requires minimum foundation mounting. It sits entirely above the floor and can be placed on a grid over a sand return system.

The completely automatic molding cycle, which requires only a few seconds, consists of a conventional prejolt, if desired; swinging the ramming head over the mold; raising the mold against the ramming ahead and simultaneously squeezing and jolting the mold; raising the flask support pins; vibrating the pattern and lowering the flask on adjustable support pins in raised position; swinging ramming head to rear while pattern is drawn by lowering of the squeeze piston. Pushbutton safety control permits operator to stop the machine at any point in the molding cycle. Made by **Tabor Mfg. Co.**, Lansdale, Pa.

For More Details Circle No. 477—Page 204

LITERATURE

Core Ovens

Installation photographs, engineering data, dimensions, specifications, and design features of dielectric core ovens for foundry use are highlighted in Bulletin 657.—**Foundry Equipment Co.**, Dept. 1D, 1831 Columbus Rd., Cleveland 13, Ohio.

For More Details Circle No. 410—Page 204

Car Shaker

Operating advantages, specifications and typical applications of car shaker for unloading granular material from open, hopper-bottom gondola cars are highlighted in bulletin O7B7221B. — **Allis-Chalmers Mfg. Co.**, Milwaukee 1, Wis.

For More Details Circle No. 411—Page 204

Chain Chart

Chart lists 12 commonly used types of chain, lists the trade name of the manufacturer of each type, identifies each with a photograph, and provides specifications on McKay's welded and weldless aluminum and stainless steel chain.—**McKay Co.**, 326 McKay Bldg., Pittsburgh 22, Pa.

For More Details Circle No. 412—Page 204

Thermometers

Folder details two basic types of fast reading metal-probe thermometers and shows the various configurations in which they are available.—**Royco Instruments**, 722 Arthur St., Albany, Calif.

For More Details Circle No. 413—Page 204

Patterns and Models

Folder describes facilities for making wood and metal patterns and models. Equipment is available to manufacture extremely large, unusual, or intricate patterns.—**Linden Pattern Corp.**, 1807 West Elizabeth Ave., Linden, N. J.

For More Details Circle No. 414—Page 204

Pneumatic Tools

Bulletin 63 details line of pneumatic production tools, including grinders, sanders, rammers, filing and cutting tools, and accessory items.—**Airetool Mfg. Co.**, Springfield, Ohio.

For More Details Circle No. 415—Page 204

Weight Measurement

Catalog 12 compares batch-in, batch-out, and continuous weighing processes, and explains how a completely automatic weighing system can be assembled by building block techniques. Pneumatic and electrical weight transmitters

For Foundrymen

are discussed.—**Weighing and Control Components Inc.,** 448 Lincoln Ave., Hatboro, Pa.

For More Details Circle No. 416—Page 204

Plastic Fire Brick

Graphcol, a plastic fire brick containing graphite for use in lining and patching ladles, spouts, cupolas and runners or wherever molten metal comes in contact with refractory linings, is described in bulletin 872.—**Denver Fire Clay Co.,** 2301 Blake St., Denver 5, Colo.

For More Details Circle No. 417—Page 204

Exhaust Purifiers

Exhaust purifiers for oxidizing carbon monoxide, fumes and odors from gasoline, LP gas, and diesel powered equipment are illustrated and described in Folder, "Exhaust Fumes Are Poison."—**Oxy-Catalyst Inc.,** Wayne, Pa.

For More Details Circle No. 418—Page 204

Thermocouple Controller

Specifications, ordering instructions, features, and application information on a thermocouple signalling controller for two-position control are contained in Data Sheet ND47-33(1). — **Leeds & Northrup Co.,** 4901 Stenton Ave., Philadelphia 44, Pa.

For More Details Circle No. 419—Page 204

Blast Cleaning Rooms

Catalog 142-D contains detailed descriptions of airless blast cleaning rooms engineered for specific individual applications. Abrasive blast wheel which is standard on all Wheelabrator rooms is described also.—**Wheelabrator Corp.,** 1102 South Byrkit St., Mishawaka, Ind.

For More Details Circle No. 420—Page 204

Flask Selection

Booklet, "How to Select and Maintain Foundry Flasks," contains information to help the foundryman make the proper selection and extend the useful life of foundry flasks. — **Sterling Wheelbarrow Co.,** Milwaukee 14, Wis.

For More Details Circle No. 421—Page 204

Conveying Systems

Specifications, selection data, blueprints, and general information concerning rollers and frames for gravity and live roller conveying systems are provided in brochure. — **Alvey-Ferguson Co.,** 1829 Disney St., Cincinnati 9, Ohio.

For More Details Circle No. 422—Page 204

COMPRESSED AIR FILTER

Model 500 Vi-Speed Dehumidi-Filter for compressed air systems has a capacity for filtering 1700 cfm of saturated air at 100 psi. The unit uses an antirust, desiccant type filter to process air to a pure, dry, safe instrument quality. The filter is engineered to provide a single, low dew point filtration unit for firms having an equivalent up to 425 hp compressor output. The entire compressed air output can be filtered at one central location to eliminate the maintenance of numerous small filters throughout the plant. Made by **Van Products Co.,** 5738 Swanville Rd., Erie, Pa.

For More Details Circle No. 423—Page 204

DIRECT-CURRENT WELDER

Direct-current welder features a new transformer, weld stabilized circuit and completely sealed semimetallic rectifier. The Gold Star SR series of welders is said to deliver maximum arc stability for greater metal deposition with all electrodes in all positions. All Miller SR series welders—200, 300, 400, 600 and Duplex—are available in the Gold Star machines. Claim also is made that the machine has a high circuiting current which makes it possible to "pinch the arc" in vertical and overhead welding. Made by **Miller Electric Mfg. Co.,** Appleton, Wis.

For More Details Circle No. 424—Page 204

FORK LIFT TRUCK

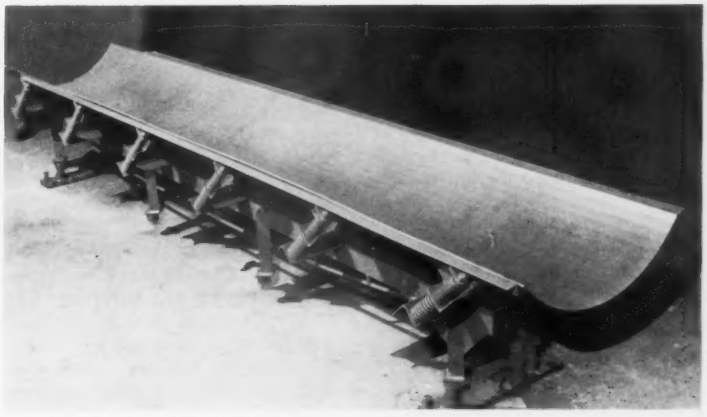
Pneumatic-tired fork lift truck Model FGF-20 of 2000 lb capacity has a turning radius of 71 in., and turns into a minimum intersecting aisle 65 in. wide. Over-all length without forks is 72¾ in. A 29-hp engine propels the truck at 11.2 mph and the drawbar pull with rated load is 1500 lb. Free lift with single cylinder is 11 in.; with dual cylinder free lift is 65¾ in. Tilt is 8 degrees forward and 10 degrees back. Over-all width of the unit is 35½ in. Standard lift height is 130 in. Made by **Baker-Raulang Co.,** Box 5579, Cleveland 1, Ohio.

For More Details Circle No. 425—Page 204

TEMPERING UNITS

Two controlled-atmosphere tempering units, with and without a cooling chamber, can be maintained to a maximum temperature of 1400° F. Work is manually loaded into the

Conveyor Designed To Handle Hot Materials



VIBRATING CONVEYOR specifically designed for handling hot sprues also is adaptable to moving castings, sand, flasks, and similar material. The conveyor is powered by low-pressure compressed air rather than electricity. The unit is made of iron and steel, and the conveyor trough is supported on several steel springs anchored to the bed. The entire assembly is bolted to the floor to give the unit proper rigidity.

The springs amplify and reinforce the vibrations supplied by the drive mechanism mounted under the conveyor pan. No bearings are used on the conveyor, and the drive mechanism has one moving part to minimize operating maintenance and breakdowns. The manufacturer claims the metallic construction makes the conveyor ideal for high temperature areas and materials. Made by **Cleveland Vibrator Co.,** 2728 Clinton Ave., Cleveland 13, Ohio.

For More Details Circle No. 478—Page 204

heating chamber from a roller platform. Units having a cooling chamber pass work straight through; those without use same door for loading and unloading. Work areas in both furnaces are 24 in. wide x 36 in. long x 18 in. high. Sealed alloy radiant tubes in gas burners have a maximum output of 500,000 Btu per hr. Both types have a complete instrument panel and two thermocouples for temperature control and excess temperature safety. Made by **Eclipse Fuel Engineering Co.**, Rockford, Ill.

For More Details Circle No. 426—Page 204

TRANSMISSION BELT

Power transmission belt is a combination of polymer and chrome tanned leather. The polymer has a tensile strength of 28,500 psi and its modulus of elasticity is 78,230 psi. The chrome tanned leather carries none of the load but serves as a friction surface. Claimed features of the belt are as follows: Will not slip or stretch; will operate at speeds up to 24,000 fpm and horsepowers up to 6000; will deliver smooth constant speed at low tensions and at slow speeds, and will operate at ratios up to 20:1 and arcs of contact as low as 90 degrees. Imported by **Extremultus Inc.**, 405 Lexington Ave., New York 17, N. Y.

For More Details Circle No. 427—Page 204

HEAT-RESISTANT RUBBER

Improved type butyl rubber will withstand a sustained temperature of 400° F and a peak load of more than 700° F for short periods of time. The rubber compound is being used in conveyor belts, hose, and a variety of industrial molded products. The company is engaged in a field testing program in high temperature applications (including foundries). Made by **United States Rubber**, 1230 Avenue of the Americas, New York 20, N. Y.

For More Details Circle No. 428—Page 204

ELBOW FITTINGS

Hose elbow fittings reportedly simplify hose installation in confined spaces and reduce the number of joints and fittings required. Fittings are made from formed tubing and are available in swivel nut ends with JIC and SAE threads. Mating adapters also are supplied for straight gasket seals and pipe threads. All parts are steel. Fittings are made in 45 and 90 degree configurations and are designed for use with Aeroquip medium and high pressure hose. Applications include any hydraulic, fuel, air, water or lubricating oil installation requiring a short radius connection. Made by **Aeroquip Corp.**, Jackson, Mich.

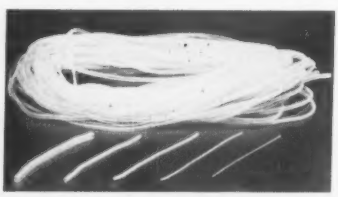
For More Details Circle No. 429—Page 204

FILTER-SEPARATOR

Replaceable cartridge type filter-separator is engineered to remove condensed water, water-borne contaminants and solids from fuels, oils, solvents and other oleaginous liquids at flow rates of from 5 to 40 gpm with 100 per cent effectiveness. It is said also to be suitable for a variety of aqueous solution treatments. Maximum working pressure is 150 psi. Constructions for higher pressures may be had. The cartridge is a 1 in.-thick wrapping of resin-bonded glass fiber on expanded metal. Made by **Richard Engineering Co.**, Seventh and Hospital Sts., Richmond 5, Va.

For More Details Circle No. 430—Page 204

Textile Core Vents Disintegrate Completely



CORE VENTING MATERIAL for shaping irregular channels in sand cores disappears completely after exposure to moderate heat. Tex-Vent, as the material is labeled, is a flexible tubing of textile material that reportedly will reduce corebaking time, eliminate sealing of openings, give permeability to cores, and eliminate porosity in castings. As castings are cleaner, finishing time is reduced, and fewer rejects are said to occur.

The material allows unrestricted use of air setting processes. Storage is no problem as Tex-Vent is unaffected by temperature changes. Forty-eight-yard skeins in diameters of 1/16, ⅛, ¼, ⅜, and ½ in. can be supplied. Tex-Vent is made in Switzerland and distributed through **Domestic Industries Inc.**, 470 West Broad St., Columbus 22, Ohio.

For More Details Circle No. 479—Page 204

LITERATURE

Pneumatic Conveyors

General dimensions, capacities, and typical installations of pneumatic pipeline systems for moving all types of foundry and core room sand mixes and other materials are contained in Form 100-655.—**Whirl-Air-Flow Corp.**, 4937 Fullerton Ave., Chicago 39, Ill.

For More Details Circle No. 431—Page 204

Batteries

Scope of motive-power battery maintenance and repair is described in revised edition of Bulletin GB-1599A. Every phase of battery maintenance, repair, and selection is covered.—**Gould-National Batteries Inc.**, Trenton 7, N. J.

For More Details Circle No. 432—Page 204

Safety Equipment

Catalog 10 is a comprehensive guide to entire line of safety equipment of all types for all industries. — **General Scientific Equipment Co.**, 7516 Limekiln Pike, Philadelphia 50, Pa.

For More Details Circle No. 433—Page 204

Fork Truck

Specifications, operating information, and application photographs of the F-38T2 2000-lb-capacity electric-powered fork truck are found in folder.—**Elwell-Parker Electric Co.**, 4205 St. Clair Ave., Cleveland 3, Ohio.

For More Details Circle No. 434—Page 204

Cartridge Heating Unit

Selection data, specifications, installation information, and types of cartridge heating units available for industrial applications are described in Bulletin 365.—**Watlow Electric Mfg. Co.**, 1376 Ferguson Ave., St. Louis 14, Mo.

For More Details Circle No. 435—Page 204

Spectrographs

Brochure CH403 features specification tables and graphs, characteristics, and design and application data on a variety of prism and grating spectrographs and related accessories. — **Jarrell-Ash Co.**, 26 Farwell St., Newtonville 60, Mass.

For More Details Circle No. 436—Page 204

Building Maintenance

Handbook, "How To Use Measured Work Techniques to Reduce Cleaning and Maintenance Costs," contains information valuable to persons responsible for quality and cost control of building cleaning

USE THIS CARD FOR ADDITIONAL DETAILS ON EQUIPMENT, SUPPLIES AND LITERATURE DESCRIBED IN THIS SECTION

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402	422	442	462	482	502
403	423	443	463	483	503
404	424	444	464	484	504
405	425	445	465	485	505
406	426	446	466	486	506
407	427	447	467	487	507
408	428	448	468	488	508
409	429	449	469	489	509
410	430	450	470	490	510
411	431	451	471	491	511
412	432	452	472	492	512
413	433	453	473	493	513
414	434	454	474	494	514
415	435	455	475	495	515
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418	438	458	478	498	518
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operations.—**Advance Floor Machine Co.**, 4100 Washington Ave. North, Minneapolis 12, Minn.

For More Details Circle No. 437—Page 204

Electronics

General Catalog for 1958 lists over 27,000 items for radio, electronics and allied fields. Special emphasis is placed on equipment for industrial maintenance, research, and production requirements.—**Allied Radio Corp.**, 100 North Western Ave., Chicago 80, Ill.

For More Details Circle No. 438—Page 204

Fluxing Tubes

The gas fluxing process and the use of graphite fluxing tubes for introducing gaseous fluxes into aluminum melts are discussed in Bulletin 3AB.—**Speer Carbon Co.**, Speer Carbon Division, St. Mary's, Ohio.

For More Details Circle No. 439—Page 204

Oilless Bearings

Specifications, sizes, operating characteristics, installation procedures, and general engineering information on Arguto self-lubricating oilless bearings for roller and screw conveyors are contained in Catalog 240.—**Arguto Oilless Bearing Co.**, 139 West Berkley St., Philadelphia 44, Pa.

For More Details Circle No. 440—Page 204

Automatic Loaders

Dimensions, operational features and advantages of Man-O-Steel automatic loaders for heat treat furnaces and continuous tumbling operations are covered in bulletin 20. —**Michigan Crane & Conveyor Co.**, 115 North McKinstry Ave., Detroit 9, Mich.

For More Details Circle No. 441—Page 204

Valves and Cylinders

Photographs, line drawings, and general descriptions of company's 1000 standard line of air or hydraulic valves and cylinders are offered in folder.—**Rivett Inc.**, Brighton 35, Mass.

For More Details Circle No. 442—Page 204

Speed Selector

Pocket-size grinding wheel speed selector provides a simplified method for quick determination of correct grinding wheel speed. Reference table shows speeds recommended for standard types and shapes of grinding wheels.—**Simonds Worden White Co.**, 1101 Negley Pl., Dayton 7, Ohio.

For More Details Circle No. 443—Page 204

EPOXY RESIN COMPOUND

Blue epoxy resin compound, Sonite SC-2, is made for hand lamination systems where surface hardness and resistance to abrasion are essential. The material has sufficient thixotropy for application as a heavy brush coat, without sagging, on a vertical surface. It has a long storage life—at least 12 months in a closed container. One-half pound of the material will cover one square foot with a 1/16-in. layer. Made by **Smooth-On Mfg. Co.**, 572 Communipaw Ave., Jersey City 4, N. J.

For More Details Circle No. 444—Page 204

DUST COLLECTOR

Model 520-D dust collector is 10 in. higher than the standard model, has identical air handling characteristics and base dimensions, but has a storage bin that is over twice as large. It is recommended for use in metalworking shops or other applications where dust volume is large. Made by **Aget Mfg. Co.**, Adrian, Mich.

For More Details Circle No. 445—Page 204

CONVEYOR GATE

Conveyor hinge section operates with 10 lb of lifting effort and offers an advantage to the man who must operate a conveyor gate while carrying a load or pushing a loaded hand truck. The counterbalanced hinge section, furnished in all widths of Rapistan wheel and roller type conveyors, consists of a stationary section of conveyor with a 3-ft-wide gate. The hinge section requires 21 in. minimum clearance from floor to bottom of conveyor. Three adjustable sizes, offering a range of 21 to 51 in., are available. Made by **Rapids - Standard Co.**, Grand Rapids, Mich.

For More Details Circle No. 446—Page 204

CUTOFF WHEEL

Exceptional wheel life is claimed for new BZ2AA reinforced cutoff wheel for floor stand and swing-frame applications of foundry cutoff work. Increased efficiency reportedly results from an improved resin bond described as having wearing qualities closely matched to the wearing and fracturing behavior of the abrasive grain. The wheel is suited for both ferrous and nonferrous work. Diameters are available from 12 to 20 in., with hole sizes to fit all standard machines. Thicknesses range from ⅛ to ¼ in. Made by **Bay State Abrasive Products Co.**, Westboro, Mass.

For More Details Circle No. 447—Page 204

IMPREGNATION SEALANT

Metallic 909 Sealant for impregnation of porous castings contains a suspension additive that reduces fallout of sealant fluids to five per cent over a 24 hour period. The material is available for shipment in drums

Carrier Contains Auxiliary Dump Hoist

CAB-CONTROLLED twin-hook hoist carrier contains an auxiliary hoist for dumping. Of weatherproof construction for outdoor service, the unit will pick up tote boxes of material, haul them, and empty by tipping. While the carrier was designed expressly for handling slag in a steel mill, it is suitable for a wide variety of materials such as castings, sand, machined parts, and various bulk materials.

Hoisting and travel motions are controlled by the cab operator. The main hoist alone raises or lowers a tote box in upright position. Hoist speed is 35 fpm. Travel speed is 250 fpm. Variable-speed drum controllers are provided. Capacity is 12,000 lb (6000 lb per hook). Other carriers of different capacities can be furnished. Made by **Cleveland Tramrail Division, Cleveland Crane & Engineering Co.**, Wickliffe, Ohio.

For More Details Circle No. 480—Page 204

containing from 5 to 53 gal. Made by **Imprex Division, Ideal Industries,** 2023 South 60th St., Milwaukee 19, Wis.

For More Details Circle No. 448—Page 204

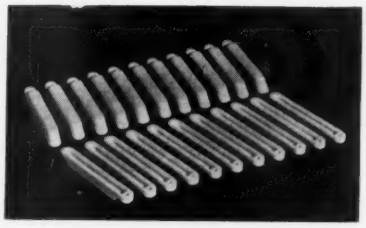
CLAM SHELL BUCKETS

Fast-release clam shell buckets for material handling operations feature carefully calculated inside and outside arm lengths, proper distribution of weight, and a unique pulley design said to result in a bucket that opens and closes with extreme speed. Cutting teeth and cutting lip are made of a low-carbon alloy plate steel. Block and tackle type reeving is used to keep cables and pulleys out of contact with material being handled. Made by **Hutton Fabricating Mfg. Corp.,** 2736 East 79th St., Cleveland 4, Ohio.

For More Details Circle No. 449—Page 204

COMBUSTION BOAT

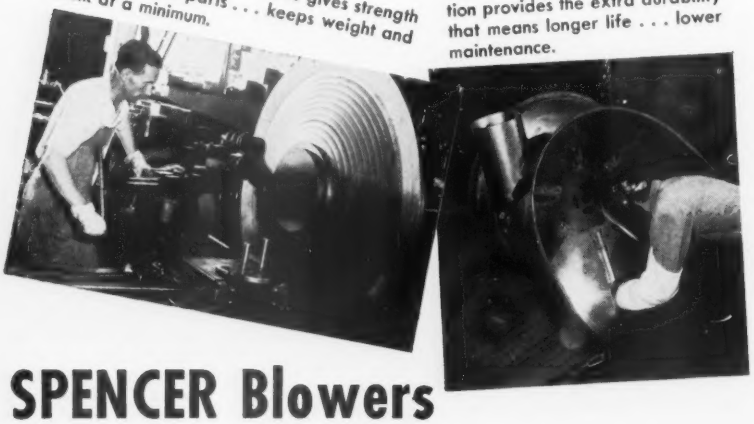
Combustion boat for carbon-sulfur analyses reportedly is of high thermal shock resistance, low penetration composition. The boat is light in color and measures 3¾ in. long x ½ in. wide x 7/16 in. deep. Made by **Harry W. Dietert Co.,** 9330 Roselawn Ave., Detroit 4, Mich.



For More Details Circle No. 450—Page 204

POWER SPINNING of heads gives strength and rigidity to parts . . . keeps weight and bulk at a minimum.

ALL WELDED sheet steel construction provides the extra durability that means longer life . . . lower maintenance.



SPENCER Blowers

perform better because they're *made* better

Operation of any blower can only be as good as the workmanship that goes into making it.

That's why, step by step in the manufacture of SPENCER blowers—from the careful rolling of sheet steel to form casings . . . to the final painting with lead-base paint and then enamel—no effort is spared to produce the most reliable, sturdily constructed blowers on the market.

Spencer recognizes that *there are no short cuts to quality.* That's why SPENCER blowers have been preferred for forty years by leading furnace and other equipment manufacturers.

SPENCER Blowers are available in these capacities:

H.P.—1/3 to 1,000
CFM—Up to 20,000
Pressure—4 oz. to 10 lbs.

Request Catalog 126-A containing complete specifications.

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OTHER QUALITY SPENCER PRODUCTS

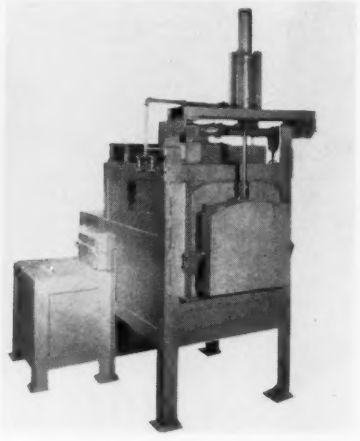
STATIONARY VACUUM SYSTEMS

PORTABLE VACUUM CLEANERS

PNEUMATIC CONVEYING SYSTEMS

REVERBERATORY FURNACE

Top-fired, double-chamber, dry hearth reverberatory furnace for meltdown of aluminum for diecasting, permanent mold, and sand casting operations is available for gas, oil,



or combination firing. Burners are mounted in the arch or roof for firing down into both melting and holding chambers. Pilots for burners are located over and integral with main burners so they can't become clogged with dross. Sixteen combinations of sizes and dipout arrangements are available. Hourly capacities range from 300 to 2000 lb. As long as the furnace operates at its normal melting temperature of about 1700° F, aluminum cannot penetrate the refractory, and maintenance is minimized. Oxide inclusions are cleaned from the furnace by raking the hearth. Made by **Industrial Furnace Division, Eclipse Fuel Engineering Co.,** Rockford, Ill.

For More Details Circle No. 451—Page 204

ABRASIVE TOOLS

Six types of tools made from Perma-Grit T-C abrasive can be used for many abrasive applications. Tools are made by brazing tungsten-carbide

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Circle 691 on Page 51

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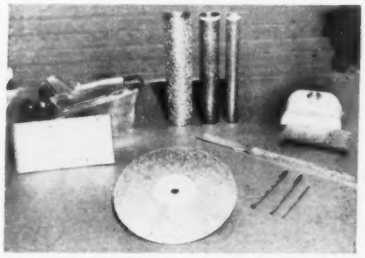
grits on steel sheets, rods, and sleeves. Ruggedness of the grits, their permanent and rigid bond, and the heat dissipating qualities of the steel base keep the grits sharp indefinitely, according to the manufacturer. In the foreground is a toothless-circular saw

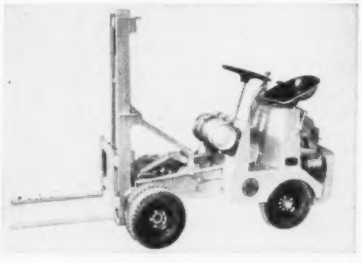


blade which cuts as it sands. At left is a standard-size grit shoe for powered orbital sanders. At right rear is a hand sander with its grit shoe. Other tools are a T-C grit file and grit sleeves and rods for spindle sanders. Rods are available in ⅛, 3/16, and ¼-in. diams. Sleeves are made from ¼-in. diam up to 3 in. Made by **Skil Corp.**, 5033 Elston Ave., Chicago 30, Ill.

For More Details Circle No. 452—Page 204

LPG POWERED WHEELBARROW

Liquefied petroleum gas power units are available for the S-10 and R-15 Moto-Bug material handling units. Carrying capacities of the S-10 are 1500 lb with tilting platform, 1500 lb with 10 to 15 cu ft gravity dump hopper, and 1000 lb with hy-



draulic fork lift. Comparable capacities for the R-15 are 2000 lb with tilting platform, 2000 lb with 15 or 18 cu ft gravity dump hopper, and 1500 lb with hydraulic fork lift. Made by **Kwik-Mix Co.**, division of Koehring Co., Port Washington, Wis.

For More Details Circle No. 453—Page 204

ELECTRIC VIBRATORS

Electric external vibrators of German manufacture are available in several models with rigid and swinging bases. Vibrators are stocked for 208-240 v, 60-cycle, 3-phase current. Other voltages and frequencies on special order. Amplitude of the vi-

Quantity and Quality are *Guaranteed* when you specify Neville Foundry Coke

As a merchant producer of Neville Foundry Coke, Pittsburgh Coke & Chemical now has four batteries of ovens to serve you. That's your guarantee of reliable, continuing supplies when you specify Neville.

What's more, we guarantee the *quality* of our coke, too. For Neville Foundry Coke is made from clean, washed coals containing a high percentage of Pocahontas and carefully processed to produce stronger, denser, more uniform coke with more fixed carbon and less ash and sulphur. As a result, Neville Foundry Coke provides maximum temperature at the nose of the tuyere to give you hotter, cleaner, more fluid iron.

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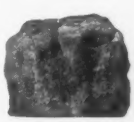
NEVILLE PIG IRON



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brators is adjustable by eccentric discs. The units will stand overloading for short periods and have a high pull-out torque. Imported by **Hydrotile Machinery Co.**, Nashua, Iowa.

For More Details Circle No. 454—Page 204

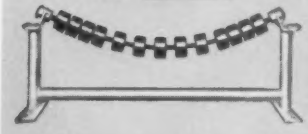
FINISHING SOLUTION

Nero-Zinc solution produces deep, lustrous black finishes on either plain zinc diecast or zinc-plated parts in about 10 to 120 seconds of immersion time, depending on the temperature range of the bath. According to the manufacturer, the solution produces finishes with no increase in dimensions of the treated parts. One part of the solution is added to three parts of water to form a bath solution and is heated to a temperature between 110-150° F. In the case of zinc-plated parts, they are placed in the bath following the second cold water rinse after plating. A tank of stainless steel, ceramic, or mild steel that is lined is adequate for the bath. Made by **Wagner Bros. Inc.**, 400 Midland, Detroit, Mich.

For More Details Circle No. 455—Page 204

FORD Foundry uses JOY LIMBEROLLER Belt Conveyor Idlers

Joy Limberollers at work on a belt conveyor at Ford's Cleveland Foundry.



This radical, new idler is used in handling abrasive foundry sands at Ford's Cleveland Foundry. Each idler is a single roller consisting of a series of pressure-molded neoprene or rubber discs on a flexible steel cable. Only two bearings are used and these are up out of the dirt zone.

Joy's new belt conveyor idler has already given over *twelve times* the service life of conventional idlers in handling many difficult materials . . . abrasive foundry sands, coal, petroleum coke, potash, copper ores, mill tailings, iron ore, wet concrete, triple super-phosphate, ammonium sulphate and sticky fertilizers.

The Limberoller is unaffected by most corrosives that damage steel . . . is ideal for chemical, sulphur and salt plants.

Get details from ***Joy Manufacturing Company, Oliver Building, Pittsburgh 22, Pa.*** In Canada: *Joy Manufacturing Company (Canada) Limited, Galt, Ontario.*

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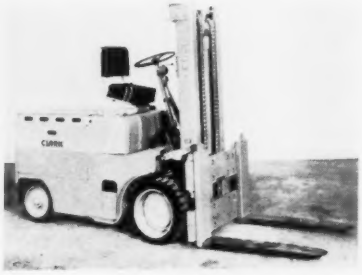
MAGNESIUM SCRIBERS

Magnesium scribers for tooling, styling, model, and pattern shops weigh 12 oz per ft and are supplied in six standard sizes up to 48 in. in length. Working surfaces are hand scraped to an accuracy of 0.0001 in. A tip of hardened and ground tool steel is provided. Made by **Challenge Machinery Co.**, Grand Haven, Mich.

For More Details Circle No. 456—Page 204

FORK TRUCK

A 10,000-lb-capacity, battery-powered fork truck, the EUT-100, has a turning radius of 88 in., minimum aisle for right angle stacking of 105 in. plus load length, and travel speed of 5.3 mph loaded. A dual hydraulic pump gives positive control of up-

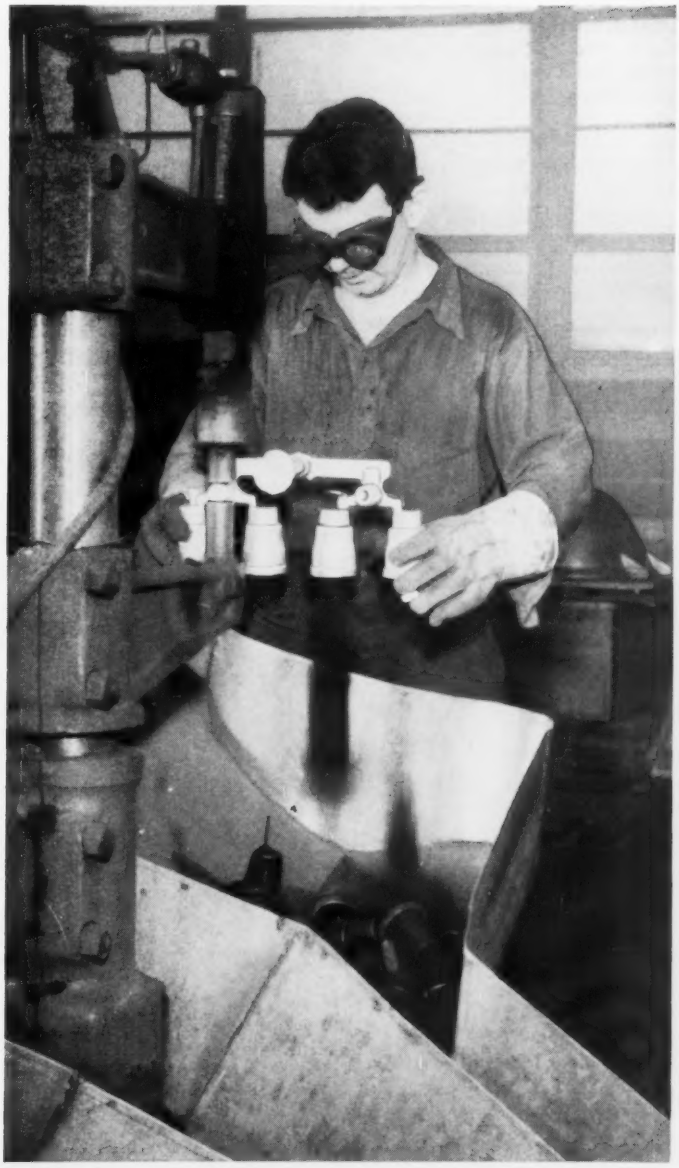


right tilt and permits lift speeds of 23 fpm. Dimensions include length, less forks, of 97 in., width of 51 in., and weight, less battery, of 14,390 lb. A forward-reverse selector lever on the steering column controls direction and automatically puts the machine into first point of power. Made by **Clark Equipment Co., Industrial Truck Division, Electric Truck Section**, Battle Creek, Mich.

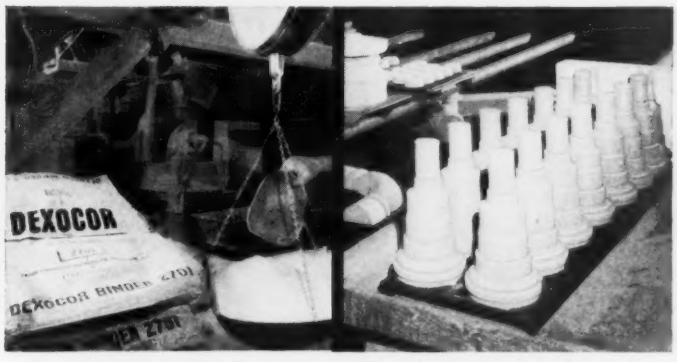
For More Details Circle No. 457—Page 204

OVER-RIDING CRANES

Over-riding cranes in capacities from 1 to 10 tons and for spans up to 50 ft are supplied in hand-pushed, hand-chain driven or motor-driven styles. They can be had as complete assemblies or as packaged components for assembly at the job site. Individual components include end trucks with all necessary bridge beam attachments, motor drive parts, controls and electrification equipment. Designs for either single or



No back-up of castings at shake-out stations now! Excellent collapsibility of cores is one of the many advantages provided by Dexocor.



A soluble dry powder, Dexocor is easy to weigh and mix, assures high green strength, cores withstand necessary handling.

Finished cores made with Dexocor are baked in up to one-third less time, stand up against hot metal during pouring.

"Truly phenomenal collapsibility" OF CORES CREDITED TO DEXOCOR® BINDER

Leading non-ferrous foundry finds this revolutionary new binder brings about many other improvements—from mulling to shake-out.

Plagued by back-up of castings at shake-out stations, this 5 tons-per-day aluminum foundry sought means of improving collapsibility of cores—and found it, in the amazing new *dry binder*, DEXOCOR.

But that was not all they discovered. Reports the superintendent:

"In addition to truly phenomenal collapsibility, DEXOCOR is easy to weigh and mix, provides excellent green strength, and both blown and rammed cores slide readily from boxes. With DEXOCOR, baking time is reduced 30 to 35%, cores stand up perfectly against hot metal—no cracking, no metal penetration, less gas and smoke—and we save 30% on cereal content of core sand mixes."

Used with Mogul or Kordek binder, DEXOCOR dry binder can improve the characteristics and performance of any core sand mix. For more information, and assistance in improving *your* operation, contact our nearest sales office, or write to:

CORN PRODUCTS SALES COMPANY
17 Battery Place, New York 4, N.Y.

Corn Products also makes MOGUL® *and* KORDEK® *binders and* GLOBE® *dextrines for the Foundry Industry.*

Circle 695 on Page 51

double bridge construction can be furnished. Made by **Becker Crane & Conveyor Co.**, 4900 Ridge Rd., Cleveland 9, Ohio.

For More Details Circle No. 458—Page 204

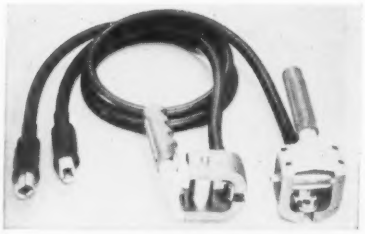
RELEASE AGENT

Stayrite 26, a lubricant and release agent for resin-coated sand mixtures, promotes uniform nonsegregating coatings and facilitates clean stripping when intermixed with shell or core mold compositions. Because particle size and bulk density are controlled to permit optimum coverage consistent with minimum tendency to dusting, molds and cores of excellent tensile strength are obtained by automatic air blowing or dump box methods. Made by **Witco Chemical Co.**, 122 East 22nd St., New York 17, N. Y.

For More Details Circle No. 459—Page 204

NONDESTRUCTIVE TESTING

Permanent magnet, known as a Leech, enables one man instead of two, as formerly, to perform Magnaflux and Magnaglo testing operations.



The unit consists of a permanent magnet, cast steel pole pieces with an aluminum carrying handle, and 5 ft of 2/0 cable. It will remain and make electrical contact as long as desired on any magnetic surface, including vertical and overhead members. The magnetizing source may be alternating, direct, or half-wave current, not exceeding 1500 amp. Made by **Magnaflux Corp.**, 7300 West Lawrence Ave., Chicago 31, Ill.

For More Details Circle No. 460—Page 204

SAFETY GOGGLE

Tuc-Cup safety goggle has a spectacle-type frame which fits over all prescription glasses. Goggle has a visor for over-eyes protection, full cup side shields for side and under-eye protection and a light frame with adjustable metal retrax temples. Lenses are optically correct, shatter-

proof methacrylate. Lenses are supplied in gold or light, medium or dark green. Retrax temples telescope in and out for the wearer's adjustment. Made by **Watchemoket Optical Co.**, 232 West Exchange St., Providence 3, R. I.

For More Details Circle No. 461—Page 204

DIE GRINDERS

Models 200 and 300 midget pneumatic die grinders for intricate precision grinding, filing, and cutting jobs combine speed with accuracy and permit vibration-free operation with any accessory cutting tools. Model 200 operates at speeds up to 60,000 rpm and weighs 4 oz. Length is 4⅞ in., with a ⅝ in. diam. Model 300 operates at speeds up to 38,000 rpm and weighs 12 oz. Length is 5¾ in., with a 1 1/16 in. diam. It is recommended that the grinders be connected to air lines that have a

REQUISITION
TO: Purchasing Dept
FROM: Plant Manager
MATERIAL REQUIRED: Abrasive Shot
REMARKS: Jack—we've tried several suppliers and found Cleveland Metal Abrasive Co.'s products best suit our needs.
G.W.

Impact cleaning, preparing surfaces for finishing, removing scale, or for any other blast cleaning or peening problem . . . The Cleveland Metal Abrasive Company has the right shot or grit for you.

Write for our new catalog today!

The **CLEVELAND METAL ABRASIVE Co.**
800 East 67th Street, Cleveland 8, Ohio
Howell Works: Howell, Michigan
Toledo Steel Shot Division: Toledo, Ohio

One of the world's largest producers of quality shot and grit-Hard Iron-Malleable (Normalized) Cast Steel (Realsteel*)* **Copyrighted Trade Name*

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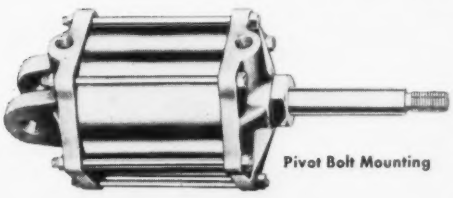
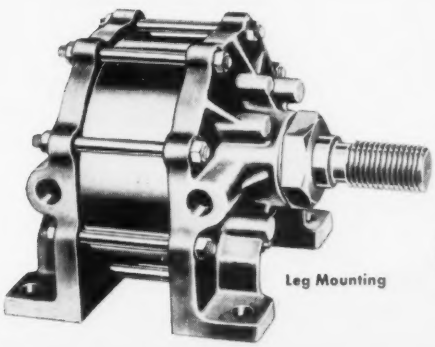
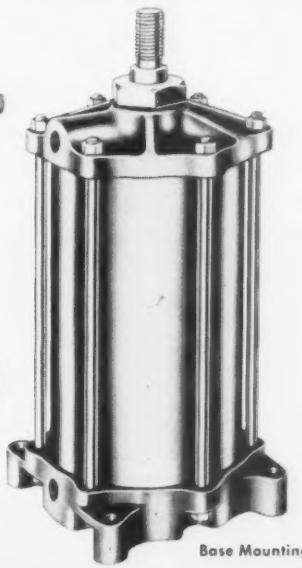
push, pull, single or double-acting, with or without cushion
. . . for every type and mounting



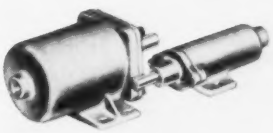
Pivot Bolt Mounting



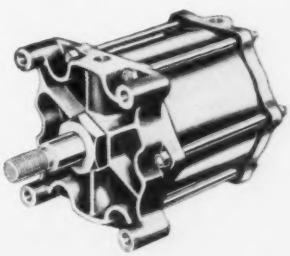
Leg Mounting



Base Mounting



Small
Clamping Cylinders



Flush Mounting

VALVES and everything you need in AIR ACCESSORIES

4-WAY VALVES

Hand

Foot

Pilot, Solenoid, Treadle and others

2- AND 3-WAY VALVES

All types: Roller, Cam, Hand, Foot, etc.

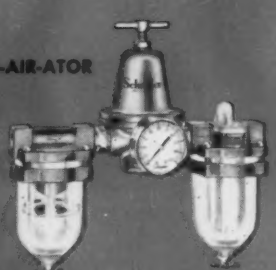
Flow Control Valves

Quick Exhaust Valves

Couplers and Hose Fittings

Ferrules and Tools

LUB-AIR-ATOR



Filter • Regulate • Lubricate
Available separately or in combination

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Various Diameters

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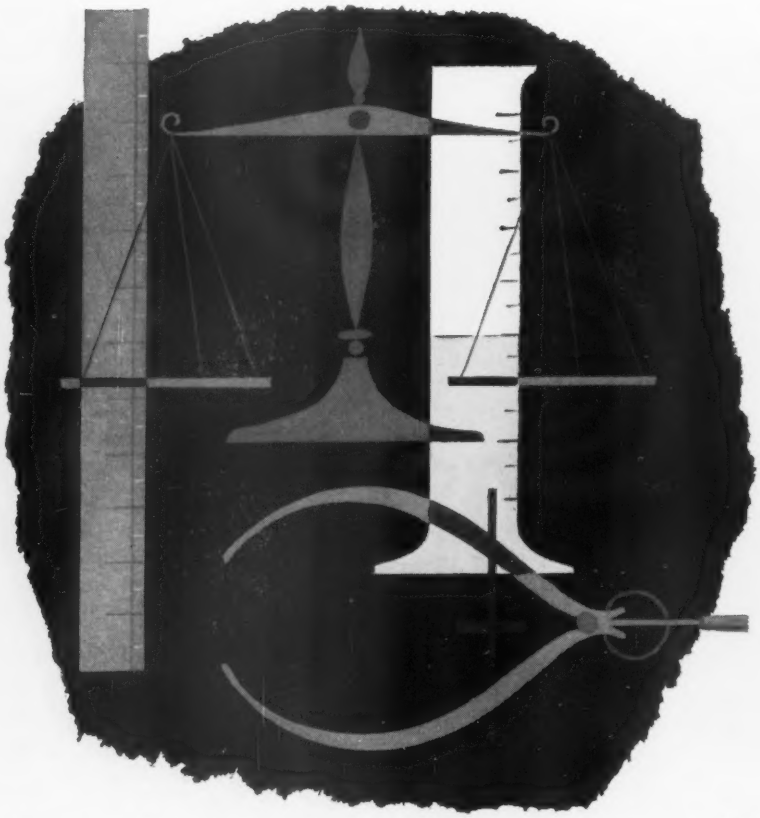
QUALITY AIR CONTROL PRODUCTS

Circle 697 on Page 51



how do you measure economy?

economy is not measured by price alone!

PROVED OVER THE YEARS

When you are concerned with metal abrasives there are many yardsticks that must be applied to truly measure economy.

How long will an abrasive last? How long before it breaks down into fines and becomes inefficient?

How destructive is the abrasive to machinery and equipment?

How efficiently does it perform and what is the time cycle for good performance?

To sum it all up — the economy of using any abrasive can be measured by the **cost per ton of metal cleaned!**

On every count, Malleabrasive has proved its superiority over the years in hundreds of plants.

If you want to improve the economy of your blast cleaning operations — check Malleabrasive.

MALLEABRASIVE

THE GLOBE STEEL ABRASIVE CO., MANSFIELD, OHIO ®

1907—Fiftieth Anniversary—1957

fog type lubricator filter as an accessory. Made by **Airetool Mfg. Co.**, 328 South Center St., Springfield, Ohio.

For More Details Circle No. 462—Page 204

pH METER

Pocket-size pH meter gives on-the-spot readings in the laboratory, plant, or field. A feature of the unit is its combination glass and reference electrode with a 36-in. lead. The sensitive electrode may be used while clamped to the instrument's side, allowing the operator a free hand to make notations. The meter is 6 in. long, 3 in. wide, 2 in. deep, and weighs 2 lb. Measurements in the range of 2 to 12 pH are possible with readability of 0.1 pH. Lower pH values can be measured by adjustment. Power is supplied by six standard batteries. Made by **Scientific Instruments Division, Beckman Instruments Inc.**, Fullerton, Calif.

For More Details Circle No. 463—Page 204

WELDING BLOWPIPE

Oxweld W-47 blowpipe can weld any metal thickness from 28 gage to 3 in. For that purpose it handles any oxygen or acetylene flow from 20 to 300 cu ft per hr. Fuel gas heads for heating jobs will handle gas flows up to 1500 cu ft per hr. A change of welding heads converts the blowpipe from light duty welding and brazing to heavy duty welding or heating. A cutting attachment equips the blowpipe for flame-cutting on metal up to 8-in. thick. Made by **Linde Co., Division of Union Carbide Corp.**, 30 East 42nd St., New York 17, N. Y.

For More Details Circle No. 464—Page 204

SEALED CASTERS

Industrial casters feature precision molded Synthi-Rubber ring seals and a formed steel, leakproof re-

USE-

MONORAIL

for

Modern Foundry Handling

It meets all requirements for space limitation. Uses overhead space under congested areas.

Versatile application. Hand or power operated carriers . . . many automatic features available.

MonoRail is permanent, inexpensive and has extremely low maintenance costs.

SEND FOR BULLETIN C-1

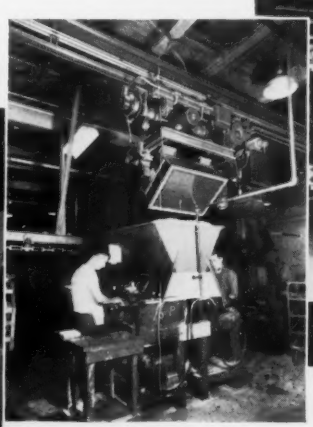
or we'll be glad to have our representative call on you.

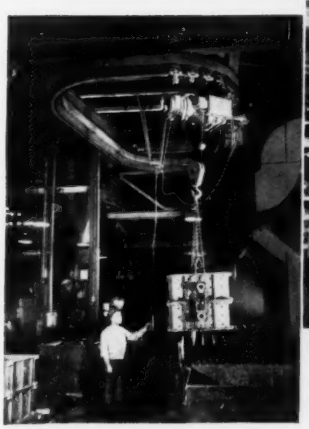
Free moving cranes cover large pouring floor

Hand pushed cranes serve mold preparation from conveyor loop

Continuous pouring with MonoTractor Carriers

Automatic dispatch delivery of fresh core sand





MonoTractor carrier serves shakeout from MonoRail loop

Member of Materials Handling Institute and Monorail Manufacturers Association

For Power Driven Conveyors, Use Landahl Chainless Conveyors

AMERICAN MONORAIL COMPANY

OVERHEAD HANDLING EQUIPMENT

13104 ATHENS AVENUE • CLEVELAND 7, OHIO

(IN CANADA—CANADIAN MONORAIL CO., LTD., GALT, ONT.)

tainer cup to insure positive grease retaining protection. The molded seal is inserted into a machined groove around the load race to provide a permanent lubricant seal for the load ball race without interference with the swiveling action. The race seals cannot be distorted by excessive lubrication pressures, the fittings having release features. Casters are available in rigid and swivel models in practically every conceivable size and capacity. Made by **Albion Industries Inc.**, Albion, Mich.

For More Details Circle No. 465—Page 204

PNEUMATIC SPRAY SYSTEMS

Pneumatic spray systems atomize oil in a nozzle of a spray valve by compressed air and can be used for grinding, sawing, cams, cables, die-casting molds, and similar applications. Systems can be gravity, siphon, air, or pump operated. Valves are the external mixing type to minimize oil fog. Two needle valves are used to control flow of the air and oil. Made by **Oil-Rite Corp.**, 2387 Waldo Blvd., Manitowoc, Wis.

For More Details Circle No. 466—Page 204

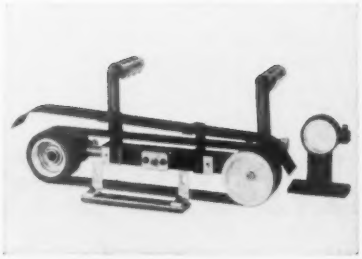
3 IMPORTANT FEATURES of

FOX Swing Frame GRINDERS

- **Perfect center balance** of wheel and motor ensures grinding ease and efficiency.
- **"Worker safety"** is carefully provided.
- **Greasing** required only once every six months . . . guaranteed for two years against repairs, exclusive of electrical equipment.

FOX GRINDERS, Inc.

OLIVER BUILDING PITTSBURGH 22, PA.



ABRASIVE BELT GRINDER

Model 2-42 abrasive belt grinder for portable or fixed bench mounting will handle any grade grit of aluminum oxide or silicon-carbide abrasive in 2-in.-wide belts. Handles may be reversed for over or under the work grinding or for right or left hand operation. Six handle adjustment combinations can be made. A 1½-hp motor gives the belt a surface speed of 6000 fpm. The unit weighs 9 lb, 4 oz. Made by **Abrasive Machinery Corp.**, Dept. 659, 444 South Pennsylvania St., Indianapolis 4, Ind.

For More Details Circle No. 467—Page 204

BELT CONVEYOR

Power-driven troughing belt conveyor can be used for handling castings and bulk material. Rubber, neoprene, or canvas belts are available, depending on the application. Com-

plete conveyors or conveyor components only can be supplied. In the units the Sage standard duty 162B roller is used. The roller is 2 in. in diam and is ball bearing equipped. Widths of 18 and 24 in. are available. Made by **Sage Equipment Co.**, 30 Essex St., Buffalo 13, N. Y.

For More Details Circle No. 468—Page 204

ADJUSTABLE PORT VALVE

Valve provides accurate control with low operating torque of air or gas flow at pressures up to 25 psig and temperatures up to 400° F. Manufacturer reports it has applications on burners for industrial furnaces, ovens, kilns, dryers, retorts, and other control applications. Designed to hold desired settings in automatic or manual control systems, the valve

Quotes from C. E. Oursler, Mgr.,
Alloy Steel & Iron Casting Division, Howard Foundry Co., Chicago

HIGH TENSILE STRENGTH MEANS LESS RESIN PER SHELL MOLD

"G-E resins have higher tensile strength than many others we have tried, so we use less resin per mold."

GOOD HOT STRENGTH MEANS FEWER CASTING LOSSES

"G-E resins have excellent hot strength, and casting losses from thermal shock are rare."

UNIFORMITY MEANS BETTER PRODUCTION CONTINUITY

"The consistent high quality of these resins helps keep our production right on schedule."

Using G-E resins, Howard Foundry casts a variety of intricate shapes to fine tolerances, gets good finishes. Examples are this yoke, crankshaft and turbine rear-bearing support.

THESE ARE THE REASONS WHY G-E SHELL MOLDING RESINS CUT COSTS FOR HOWARD FOUNDRY CO.

G.E. offers a wide range of shell molding resins, each designed to help you make better molds and cores. Write for technical information on G-E shell resins, and for the helpful brochure "59 Answers to Your Shell Molding Problems." General Electric Company, Section F-6, Chemical Materials Department, Pittsfield, Mass.

Progress In Phenolics

GENERAL ELECTRIC

provides flow rate over the full control range by 10 degree rotation of its lever. Made by **Hauck Mfg. Co.**, 124-36 Tenth St., Brooklyn 15, N. Y.

For More Details Circle No. 469—Page 204

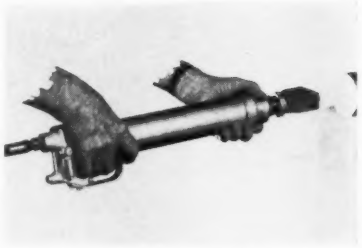
CENTRIFUGAL FANS

Series 8000 all-purpose centrifugal fans with airfoil blading are engineered for applications including building ventilation, general air supply and exhaust, conventional and high-pressure air conditioning, and combustion air supply. Streamlined air flow pattern created by the airfoil blades provides quiet operation. The series is available in standard AMCA (NAFM) sizes and will handle up to 700,000 cfm at pressures to 16¾ in. Made by **Westinghouse Electric Corp.**, Box 2278, Pittsburgh,

For More Details Circle No. 470—Page 204

PNEUMATIC MARKER

Single impact marker is air-operated and provides fast, accurate, hot or cold metal marking. It weighs

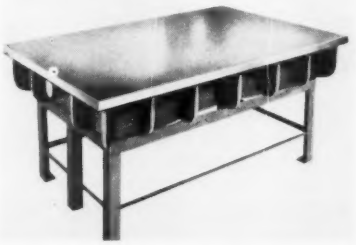


12 lb, including type head and type, and can be operated on air pressure as low as 50 lb. Interchangeable type holders will accommodate six 3/16-in. characters, four ¼-in. characters, or individual characters up to ½-in. Made by **Pannier Corp.**, 602 Sandusky St., Pittsburgh 12, Pa.

For More Details Circle No. 471—Page 204

SURFACE PLATES

Three-point suspension surface plates for toolrooms and pattern shops are made in sizes of 30 x 60 in. up to 48 x 96 in. The three-point



suspension system eliminates plate rocking if the base or stand is placed on an uneven surface. Three types of finish are available—planer finish, precision ground, and hand scraped, with surface accuracies from 0.002 to 0.0002 in. Made by **Challenge Machinery Co.**, Grand Haven, Mich.

For More Details Circle No. 472—Page 204

ALUMINA BRICK

Ironton AL-70 (70 per cent alumina brick meets all ASTM specifications for its classification of refractories. The P.C.E. value is Cone 38+ (3362° F). High density reportedly gives the refractory excellent resistance to slags and abrasion. Nine-inch straights and series brick are available as well as special shapes. Molds from customer blueprints also can be made. Made by **Ironton Fire Brick Co.**, Ironton, Ohio.

For More Details Circle No. 473—Page 204

CUTTING-GOUGING UNIT

A 1200 amp model has been added to the Carbonaire line of machines for carbon arc and compressed air cutting and gouging of all kinds of

dress your FOUNDRY grinding wheels

When a new wheel is used, sharp abrasive grains are worn dull . . . wheel pores tend to fill with metal . . . grinding efficiency goes down. But you can keep all grinding wheels at top efficiency by dressing them regularly with inexpensive Desmond mechanical dressers.

Desmond Heavy Duty dressers are designed specifically for use on high speed, coarse snagging wheels, where a fast grinding surface is desired. They are the most effective dressers on resinoid and rubber bonded wheels.

Also Desmond Hex and Huntington dressers are widely used in foundries where rough grinding is performed on large and medium size wheels. Write for catalog of our complete line and the name of your nearest distributor.

THE ONLY COMPLETE LINE OF GRINDING WHEEL DRESSERS AND CUTTERS

Desmond

THE DESMOND-STEPHAN MFG. CO., URBANA, OHIO

metals. Maximum output of the unit is 1600 amps. It is recommended for carbon electrodes over ½ in. in diam. A single rheostat gives wide range of voltage control. Ammeter and voltmeter are optional equipment. Made by **Hobart Bros. Co.**, Hobart Square, Troy, Ohio.

For More Details Circle No. 474—Page 204

LOADERS AND UNLOADERS

Loaders and unloaders are designed for handling work in and out of Ipsen automatic heat treating units. The loader incorporates a roller platform with a table type mechanism. A primary pusher bar moves the

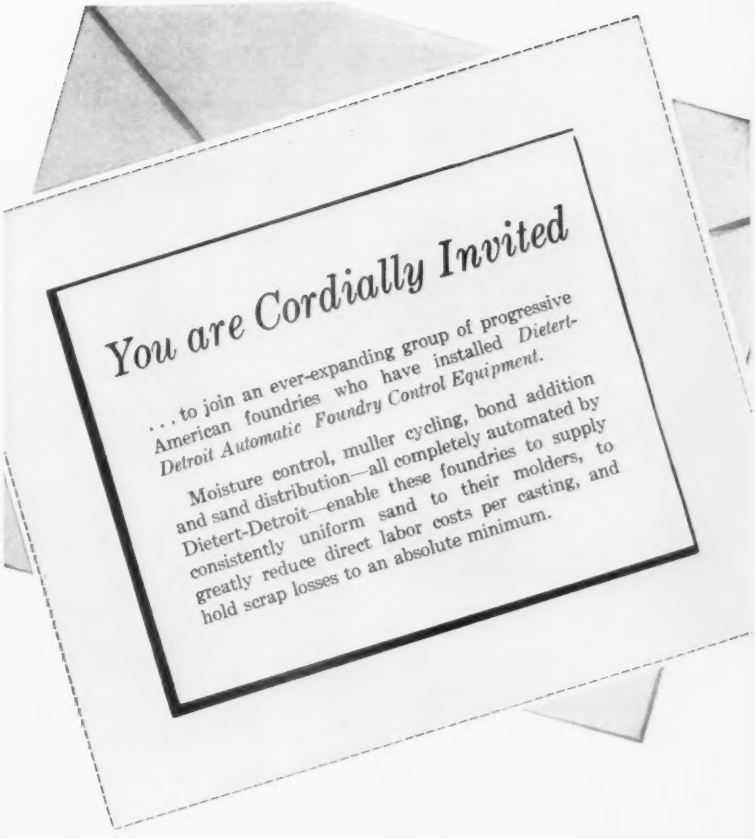
work tray forward off the roller platform. A secondary pusher bar fully advances the work into its desired position. The chain-driven mechanism retracts for the next cycle. The unloader reverses the loading action by extending grab bars through the open discharge door, grasping the work tray and bringing it out of the chamber into position on the roller platform. Both units are available for stationary mounting or with free-running or motor-driven wheel-on-track for transverse servicing of a number of furnaces or related accessories. Made by **Ipsen Industries Inc.**, 721 South Main St., Rockford, Ill.

For More Details Circle No. 475—Page 204

LENS CLEANER

Super-Clear lens fluid and antifog fluid reportedly will keep plastic and glass surfaces fog free. It can be sprayed on a lens and wiped with either a cloth or goggle cleaning tissue. The fluid is nontoxic, nonflammable, and will not deteriorate metal or rubber. Made by **American Optical Co., Safety Products Division**, Southbridge, Mass.

For More Details Circle No. 476—Page 204


You are Cordially Invited
...to join an ever-expanding group of progressive American foundries who have installed Dietert-Detroit Automatic Foundry Control Equipment.
Moisture control, muller cycling, bond addition and sand distribution—all completely automated by Dietert-Detroit—enable these foundries to supply consistently uniform sand to their molders, to greatly reduce direct labor costs per casting, and hold scrap losses to an absolute minimum.

Alloy Founders, Inc.
American Standard
Combustion Engineering, Inc.
East Jordan Iron Works, Inc.
Florence Pipe Foundry & Machine Company
General Electric Company
Golden Foundry Company, Inc.
Kelsey-Hayes Company
Muskegon Piston Ring Company
Ohio Steel Foundry Company

These companies and many others share a common objective: *to produce highest quality castings at lowest cost.*

Dietert-Detroit modern control equipment has made it possible for the foundries of these companies to increase overall efficiency, to boost quality and profits! Additional details gladly mailed. Use the coupon appearing below.

DIETERT DETROIT

HARRY W. DIETERT CO.
9330 Roselawn Avenue
Detroit 4, Michigan

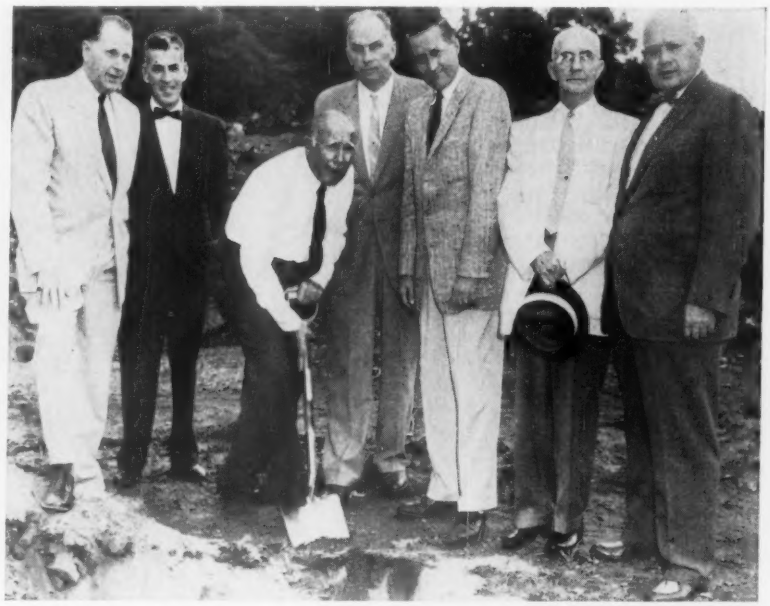
Please send us information on . . .

- ☐ Dietert-Detroit Automatic Moisture Control
- ☐ Dietert-Detroit Automatic Cycling System
- ☐ Dietert-Detroit Automatic Bin Level Controls
- ☐ Dietert-Detroit Automatic Bond Addition

NAME.....
(please print)
FIRM.....
STREET NO......
CITY.....*ZONE*.....*STATE*.....

News Views

PLANT TOUR: Nearly 200 members and guests of the New England AFS chapter visited the foundry, coreroom, and pattern shops of the Whitin Machine Works, Whitinsville, Mass., on Sept. 11. Alexander Beck, president of the AFS chapter, and superintendent, Whitman Foundry, Whitman, Mass., left, is met by R. F. Meader, superintendent, Whitin Machine Works, prior to the start of the tour. Arrangements for the tour were handled by Mr. Meader



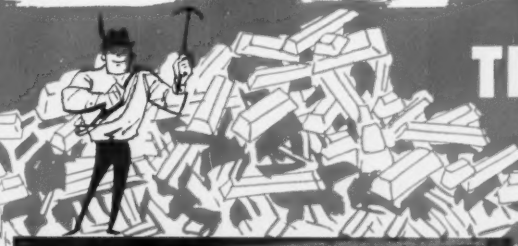
A TURN OF THE SOD: Fred W. Belz, president, Walworth Co., sinks a shovel into a section of an 85-acre tract in Braintree, Mass., as the first step in construction of a $5 million valve plant and research and engineering center. Others in the photo are, left to right, C. W. Nelson, Braintree selectman; G. J. Jackson, works manager; T. S. Paulsen, George Fuller Co., contractors; H. T. Smiley, chairman, Board of Selectmen, Braintree; F. A. Tenney, selectman, and W. M. Hall, C. T. Main Inc., Boston

HUGE CASTING: This cast aluminum section towering above the young lady weighs over 7500 lb and is the heaviest of four sections fabricated by the Aluminum Co. of America's Cleveland Works as part of a wing fabricating table for North American Aviation Inc., Columbus, Ohio. The table will hold a wing panel for precision milling. All four parts of the chuck, when assembled, measure 28 ft in length, 130 in. at the widest point, and 16 in. deep. Alcoa's 355-T7 E9 alloy was used for the castings because of its castability, hardness, and strength in a stable temper. The alloy is silicon-aluminum, with copper and traces of magnesium

BEST IN THE LAND: Raymond Westberg, 16, 8957 Escanaba Ave., Chicago, holds his brass bell which won him first prize and an award for outstanding achievement in the patternmaking and molding division of the Ford Motor Co.'s 1957 Industrial Arts Award competition. Raymond's bell was selected from more than 40,000 entries in this year's contest. He is a student at Chicago Vocational High School

Circle 703 on Page 51

WANT TO MELT A MOUNTAIN OF METAL?



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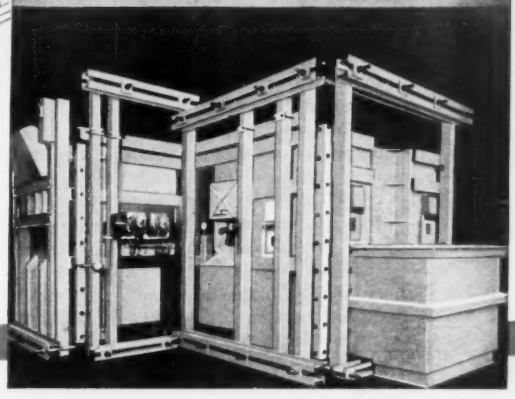

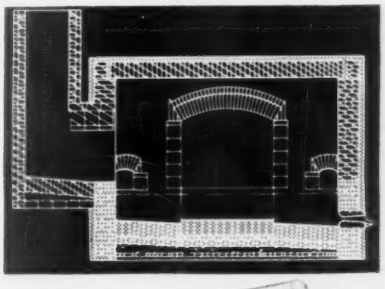

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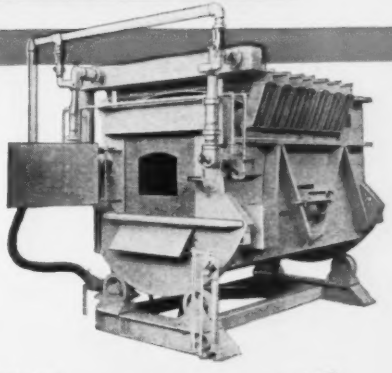

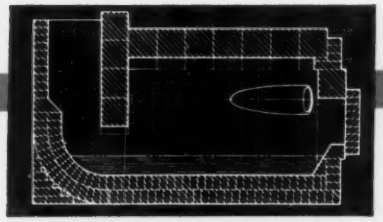

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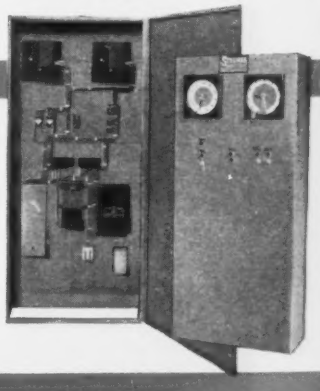

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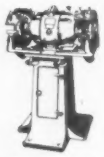

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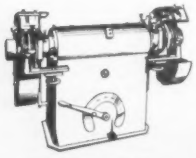

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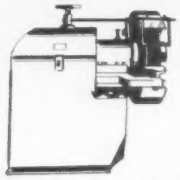

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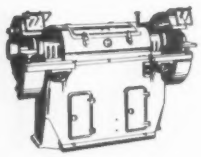

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WRITE FOR CATALOGS

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Meditations of a Sandman

By HAROLD E. HENDERSON
H. C. Macaulay Foundry Co.
Berkeley, Calif.

"Elucidate"

THE law of gravitation—or rather the description of that law, as written by Sir Isaac Newton—is said to cover some seven pages of fine print. A Chicago newsboy said approximately the same thing in seven words: "All dat goes up must come down."

This probably is an excellent example of oversimplification, but it does indicate dramatically the value of condensing and simplifying a thought to insure remembrance of the basic idea. Of course, some thoughts refuse to be expressed in simple language. For the most part, scientists communicate in a fashion understandable only to other scientists, for ordinarily these gentlemen are not addressing the ordinary layman—and certainly not a foundryman who makes no claim to higher education.

I am reminded of an experience a few years back, at an AFS Chapter Chairmen's Conference in Chicago. At the dinner, it was announced that our speaker was to be a certain atomic scientist who was being flown in from Oak Ridge especially for the occasion. It was explained that this man was connected exclusively with top-secret operations and that our committee had had great difficulty getting government permission for his appearance at our meeting.

There was some delay in his arrival, and, despite the chairman's apology, we nervously decided that the great man probably would not appear after all. Our fears soon were dispelled, however, when he strode onto the platform, in bearing and behavior a typical scientist. Surely you know what a typical scientist looks like?

His opening statement was sim-

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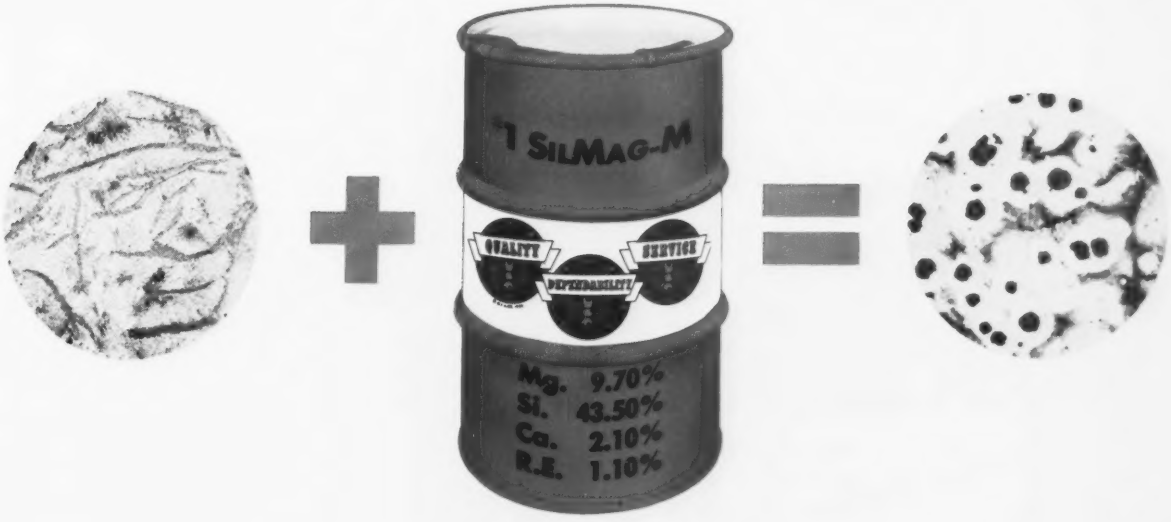

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A marked reduction in the occurrence of carbides in thinner sections promotes *increased ductility* and *lower hardness in the as-cast condition.* The cost of heat treatment can often be substantially reduced, or, in some cases, eliminated.

Whatever your interest in ductile iron, we would like to be of service. The assistance of qualified technical personnel is available without obligation.

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ple and to the point, and he immediately captured our undivided attention. He then proceeded, with the aid of very complicated appearing charts, to mystify us completely. Using words that were extremely long, and connected with no ordinary vocabulary, he rambled on for at least ten minutes without anyone present understanding his discourse. Our attention was, however, still undivided.

We leaned forward in rapt silence, for fear that a word might be lost. No one coughed or even shuffled his feet. It was unadulterated agony. Any man who can successfully conceal his ignorance for ten minutes under such trying conditions has displayed exceptional control, and we were an exceptional group of men: We did it!

But of course there had to be one among us who was either abnormally bright or stupid, and at this point, he burst into a resounding guffaw. Since we couldn't silence him, we joined him. The spell was broken. For the first time, the speaker smiled, and we realized that we were being academically spoofed. For the next twenty minutes, we enjoyed uncontrolled hilarity.

Both before and since that humorous occasion at Chicago, I have wondered whether I'm being spoofed by some of the speakers and writers who bombard us with technical profundities. In making such an assumption, I expect to be accused of diverting attention from my own ignorance by attempting to deprecate the wisdom of the man who is talking over my head. The charge to some extent is true, but in subsequent conversations, I've learned that I was not alone in my embarrassment.

Others have testified that they too had wasted their evening. Still others were noncommittal, and I suspect that some of these pridefully were concealing in silence their lack of understanding. The speakers or writers in question probably delivered messages of importance, but they might as well have been in Greek so far as most of us were concerned. These men should employ an interpreter for our benefit.

Although the language of science may never have been intended to be understood by laymen, there are, happily, many men in our industry, both speakers and writers, who have the ability to reduce most scientific terms to descriptive phrases that have "foundry significance." It is from them that we receive incalculable benefits.

I once heard a minister say that while he delivered a lengthy sermon,

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This 56" x 72" x 15" flask was designed by American's engineering department specifically for the General Electric steel foundry at Everett, Massachusetts. This is only one of many flasks we have supplied General Electric. It has both horizontal and vertical reinforcements to insure the rigidity needed to make large steel castings.

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Circle 709 on Page 51

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he didn't mind certain members of his congregation nodding or looking at their watches occasionally, but that when they put the watches to their ears, to see if they were still running, they were carrying a protest a bit too far!

Now, a highly technical paper requires no apology. The writer's message presumably is aimed at a special group who understand and want it. Others are under no obligation to read beyond the first paragraph, which usually will suffice to indicate the character of the subject matter.

The situation decidedly is reversed, however, when a speaker addresses a captive audience. His hearers have spent both time and money in the hope of receiving some tangible or at least potential benefit. If the talk is as deadly as some of them prove to be, his audience may indicate it by coughing, shuffling feet, or, at worst, by going to sleep (I haven't observed the watch trick). Most of the boys may refrain politely from open criticism, but they will be conspicuous by their absence if that speaker returns to the area.

No one suffers from such an experience more than the program chairman, for even though he had no choice in the matter, he becomes a target for criticism. One bad meeting may reduce attendance at subsequently good meetings. One bad apple in a box can turn the customers away. Of course, such an attitude is unfair, but it has been an operative rule in human conduct for a long time.

I may be accused of indulging in an angry diatribe against my superiors. Nothing could be further from my intentions. I envy the man of science for his attainments, and I admire his orderly methods and his persistence in the unending struggle toward a better order of human existence. We know that in our daily experience, we suffer repeatedly from ineffective communication.

Verbal orders tend to go astray. The fault may be in either the sending or receiving department, but the loss entailed is often critical. If we fail to communicate simple shop directions, how can we possibly grapple with a language we haven't learned?

A technical paper which supposedly dealt with a foundry sand problem recently was delivered to me for consideration. It contained not a single sentence, graph, or chart that I could understand even remotely. Hoping to gain at least some idea of the author's purpose, I passed the paper on to a number of my more educated associates, each of whom

Photograph courtesy of Whiting Corporation

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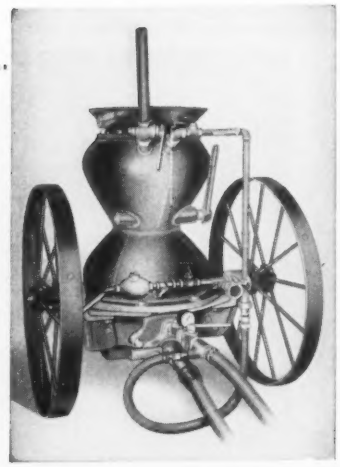
MANY MAN HOURS SAVED BY REPAIRING CUPOLAS the "CEMENT GUN"® way



The CEMENT GUN is simple to operate; two or three of your own men can learn quickly and easily, after which they can make all your cupola repairs. With the CEMENT GUN they can place a lining 1" to 6" thick in one continuous operation. They can make patches in a "hot" furnace. They can place up to 5 thousand pounds of refractory material an hour. The CEMENT GUN method saves down time, saves material and extends the life of your present linings. Write today for our FREE bulletin #3000 and check our claims.

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Circle 712 on Page 51

Neff & Fry Silo used for calcined coke

Many of our silos are currently being erected for handling and storing calcined coke. Scores of them have been in use for the same purpose over the years. The photograph shows one such installation in Pennsylvania. It is 24 ft. dia. x 60 ft. high.

There are a number of special problems in designing systems for handling calcined coke and other materials of similar consistency. Our knowledge of the subject can be of great practical value. We'll be glad to communicate or confer with you.

Our silos are constructed of Super-Concrete Staves with diagonal ends which permit steel hoops to impinge directly upon the horizontal joints. As many intervening hoops are installed as needed to met the lateral thrust of the contents. This is clearly explained in our folder, "Bins With the Strength of Pillars." A copy is yours for the asking.

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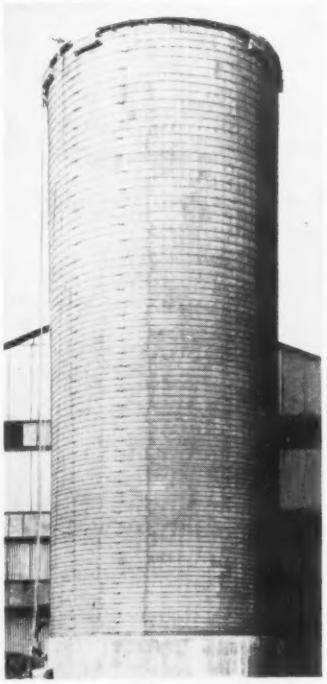

SUPER-CONCRETE STAVE STORAGE BINS

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returned it to me despairingly.

I am convinced that this writer had no intention of "spoofing" us. He is probably a man of established reputation in research and is dealing with a matter both serious and important. But his paper in its present form never should have been addressed to me or to others like me. I cannot read Homer in the original, but when his work is translated properly, I find the old boy delightful.

In one of Emerson's essays we find this sentence: "The Angels are so enamoured of the language that is spoken in Heaven, that they will not distort their lips with the hissing and unmusical dialects of men, but speak their own, whether there be any who understand it or not."

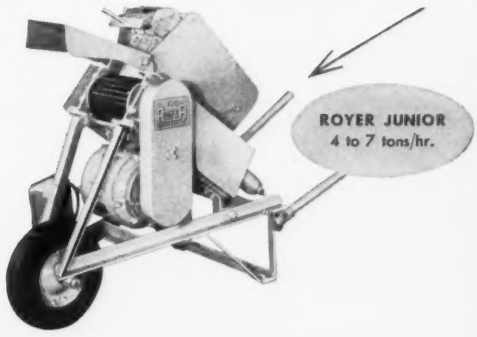
ICI Makes Plans for Annual Fall Meeting in Chicago

The Investment Casting Institute will hold its annual fall meeting at the Sheraton Hotel, Chicago, Nov. 19-21. The first day will be devoted to committee meetings; the business session will be held the last day.

W. I. Matthes, executive vice president, Arwood Precision Casting Co., New York, is program committee chairman for the technical session to be held Nov. 20.

The technical program will include these papers: "Advantages and Disadvantages of Induction Melting and Carbon Arc Melting," by L. J. DiNuzzo, General Electric Co.; "Engineering Properties of Low Melting Plastic Pattern Material," by Dr. Charles Marsel, New York University; "Production Control," by Robert H. Roehl, Howard Foundry Co., Investment Casting Div.; "Test Procedures for Proprietary Investments," by T. E. Moore, Ransom & Randolph Co.; and "Test Procedures for Pattern Materials," by Paul Solomon, Yates Dental Mfg. Co. As a special feature, Dr. N. J. Grant, Massachusetts Institute of Technology, will review his recent tour of Soviet steel mills.

Presentations to be made by subcommittees of the ICI's Process Materials Committee will include a demonstration of standardized test procedures for determining physical properties of proprietary investments by T. E. Moore, Industrial Division manager, Ransom & Randolph Co., Toledo, Ohio. Paul Solomon, sales engineer, Yates Dental Mfg. Co., Chicago, will demonstrate test procedures on pattern materials, and Dr. Charles J. Marsel, Department of Chemical Engineering, New York University, will discuss low melting plastic pattern materials.



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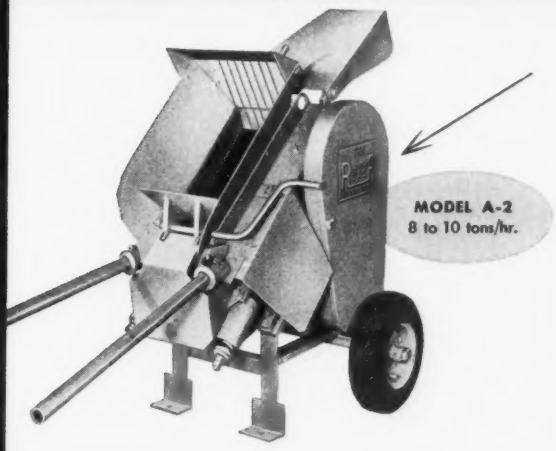

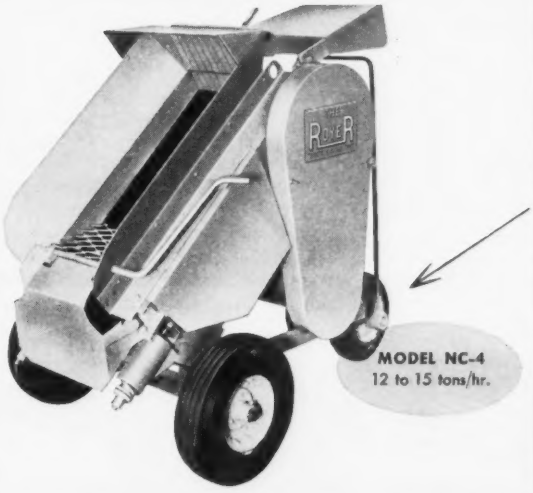

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Here are a few of the advantages you'll gain with a Royer:

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- Less new sand
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Foundrymen call Royer the "foremost in sand conditioning equipment" because Royer machines are in use throughout the world. *The majority of the foundries have bought additional units*, positive proof of satisfactory service.

Contact us today—by letter, wire or telephone—and we'll rush you descriptive literature describing the unit designed to meet your needs. Or, you can have our "foundry-wise" agents survey your problems with you.

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FOREMOST IN SAND CONDITIONING EQUIPMENT

Circle 714 on Page 51

Around the Country

NEWS REPORTS FROM

Chicago . . . Pittsburgh . . . Boston

Pittsburgh—Gray iron foundrymen, although faced with steadily rising costs, have had difficulty raising prices of their castings, due to competitive conditions in sales. A buyer of gray iron castings here says that less than half of all local foundries have raised their prices since the most recent increase in labor cost.

Most gray iron foundries in this area are reported to be operating less than five days a week. Sales to such users as the automotive industry and rolling mills are stationary and show no sign of increasing in the near future.

Steel foundries are in a stronger competitive position. They raised prices about 7 per cent on all castings, following the labor cost increase. Atomic energy business is thriving in this area, boosting requirements for steel castings.

Chicago— The five-state area of Illinois, Indiana, Iowa, Minnesota, and Wisconsin has about 20 per cent of all of the foundries in the United States. This was the situation in 1955 and it holds true in 1957. Detailed figures by states were reported in FOUNDRY for October, pp. 108-109, in the announcement of the new edition of *Penton's Foundry List* just published by the Penton Publishing Co., Cleveland.

The figures emphasize that the area of which Chicago is the hub is a pretty important segment of the castings industry. In two years, with few exceptions, it has moved almost identically with the national change.

There are fewer gray iron, malleable, brass and bronze and magnesium foundries today compared with 1955 both nationally and districtwise. On the other hand, increases have been made in steel and aluminum shops.

Specifically, the five states today have 20.2 per cent of the nation's gray iron foundries, 17.6 of steel, 33.9 of malleable, 16 of brass and bronze, 18.7 of aluminum and 16 per cent of magnesium. With investment casting and steel molding processes having enjoyed substantial expansion in the last decade, it is of interest to note that the five states now have 15 per cent of the country's investment casters and 20.5 per cent of the shell molders.

Consistent with the foregoing figures is the tabulation on jobbing versus captive operations. For example, strictly jobbing foundries in the five-state area represent 20.1 per cent of the national total. Strictly captive shops are 21.7 per cent of the United States aggregate, and foundries which engage in both jobbing and captive operations are 19.3 per cent of country total.

Boston—Iron foundry operations have flattened out in New England; second half melt schedules are not substantially heavier than the first six-months' average, and four-day-week production will be high in November for most gray iron and malleable shops. Including jobbing units, backlogs are small and some foundries are down to a three-day rate. Only steel casting producers have backlogs, up to two-three months.

Machine tool volume is slack; shipments by builders have been in excess of bookings for 11 consecutive months, and the industry backlog is down to four months compared with six months last January. Pipe, valve, and fitting volume is fairly steady—under capacity, but slightly ahead of most jobbing shop levels. Paper mill equipment shops have cut back some from earlier rates, as also have suppliers of railroad equipment.

Textile mill equipment builders, largest capacity group in New England, are not operating better than 50-60 per cent, although several are now actively bidding for job work to engage increased mechanized units. Crompton & Knowles, Worcester, Mass., is back melting after an 11-week strike, and to catch up is melting somewhat over the textile shop average. In addition to entering the jobbing field, textile equipment builders are diversifying as to product.

Diversification by Whitin Machine Works, Whitinsville, Mass., is more closely tied into existing capacity, notably the mechanized foundry. Whitin is moving up on production of a new duplicator requiring 125 parts made by the shell molding process of iron, aluminum and bronze.

Annual plant inspection by the New England Chapter, American Foundrymen's Society, was at Whitin's found-

FEF COMMITTEE MEETS: Members of Michigan State University's Foundry Educational Foundation Industry Advisory Committee met during the Michigan Regional Foundry Conference last month. The group heard reports on FEF progress and plans for future work from Chester V. Nass, Beardsley & Piper Div., Pettibone Mulliken Corp., Chicago, FEF president, and from Edward J. Walsh, FEF executive director

15-hp Carrier unit expected to pay for itself in year, ON MAINTENANCE SAVINGS ALONE!

The 78′ Carrier Natural-Frequency Conveyor shown here is about to be hit by two giant molds which will be quickly and efficiently conveyed to a shakeout.

This big mid-western foundry had formerly used a 30-hp "slow-advance — quick-return" reciprocating trough conveyor, mounted on rollers. It was a "brute-force" unit and required constant work to keep it in service. The high temperature of the sand and castings (up to 1500°F.) — two-ton shock loads on the rollers — high stress concentration at the drive — and severe abrasive wear in the many moving parts . . . *all contributed to maintenance and downtime costs in excess of $20,000 per year!*

With just *half* the horsepower, the Carrier Natural-Frequency Conveyor does *twice* the job! It handles surge loads as high as 290 tph. An extra-deep trough contains sand "splash" and eliminates spillage. Stress distribution is uniform because the rugged coil springs supporting the trough are evenly spaced, thus preventing fatigue failure of structural members. And Carrier's patented drive, which is available in NO OTHER CONVEYOR, *permits the conveyor to settle under load so that shocks from 2-ton dumps are not transmitted to the drive bearings!*

Write direct for further information. Address: Carrier Conveyor Corp., 225-A N. Jackson St., Louisville 3, Ky.

CARRIER

NATURAL-FREQUENCY®

CONVEYORS

Circle 715 on Page 51

ry this year. The plant tour was made by 175 persons, including Alexander Beck, Whitman Foundry Inc., president, New England Chapter, and William Ohlson, Draper Corp., Hopedale, Mass., program chairman. Raymond F. Meader, superintendent, Whitin Machine Works foundry, was in charge of tour arrangements.

An outstanding bright spot in an otherwise rather drab textile outlook, is a $2 million backlog for a new loom winder developed by Universal Winding Co., Cranston, R. I.

With 1957 drawing to close, iron foundry volume is off close to 20 per cent compared with 1956 in New England. Pig iron price has been increased $1 a ton for fourth quarter, Mystic Iron Works going to $68, Everett furnace, for No. 2 foundry and $68.50 for malleable. Cast scrap prices are lower, but the break has not been as sharp as in steel scrap.

Outside furnaces are equalizing at most points with Everett furnace prices. At current prices and new higher freight rates, Buffalo to equalize absorbs $9.38 a ton delivered Boston, $6.44 Worcester, and $6.98 Providence. From Troy, N. Y., the delivered rate in favor of Mystic is Boston $7.23, Worcester $4.16, and Providence $5.22.

Arrange Program for Electric Furnace Steel Conference

A comprehensive program covering a wide range of topics has been arranged for the 15th annual Electric Furnace Steel Conference to be held at the Penn-Sheraton hotel, Pittsburgh, on Dec. 4-6.

Prepared by the Electric Furnace Steel Committee of the Iron and Steel Division, American Institute of Mining, Metallurgical, and Petroleum Engineers Inc., arrangements include a plant visitation on the first day, with six technical sessions and the annual fellowship dinner on the second and third days. Details of the program follow:

Wednesday, Dec. 4

10 a.m.—Plant trip to Babcock & Wilcox Co., Beaver Falls, Pa.

Thursday, Dec. 5

9:30 a.m.—Opening session: Welcoming remarks, announcements and reports.

9:45 a.m.—Joint general session on **Nitrogen in Electric Furnace Steel.** Application of nitrogen solubility data to alloy steelmaking; nitrogen-porosity relations in chromium-nickel-manganese steels; sampling and analysis of nitrogen in electric furnace steels—review and evaluation of modern methods.

2 p.m.—Joint session on **Refractories.** Cast and rammed sections in arc furnace roofs; Canadian basic refractory practice in electric furnaces; tar-bonded basic refractories; furnace bottoms—installation of thermocouples in electric furnace hearths; ladle refractories.

6:30 p.m.—Reception and cocktail party.

7 p.m.—Annual fellowship dinner: Speaker, Edward A. Livingstone, Babcock & Wilcox Co., Beaver Falls, Pa. Toastmaster, Stanley M. Norwood, Electro Metallurgical Co., Division of Union Carbide Corp., New York.

Friday, Dec. 6

9:30 a.m.—Ingot session on **Vacuum Melting; Electric Arc Furnace Practice Variables on Quality.** Over-all summary of vacuum melting; consumable electrode vacuum melting; Induction vacuum melting; furnace practice variables and their effect on quality of aircraft and bearing steels—panel discussion.

9:30 a.m.—Castings session on **Foundry Practices.** Oxygen as an aid in electric furnace melting; some aspects of melting low-temperature, high-impact steels; spectrographic analysis in foundry.

2 p.m.—Joint session on **Economic Utilization of Power.** Power utilization and control in the electric furnace steel plant; an effective demand limiting system for the electric furnace melt shop; improvements in arc furnace power regulation and electrode hoisting systems; analysis and practical results obtained from a study of arc furnace controls.

Metal Show and Two Congresses To Draw International Audience

Some 500 key metal scientists from 40 nations are expected to be among the estimated attendance of more than 50,000 persons at the second World Metallurgical Congress and the 39th National Metal Exposition and Congress to be held in Chicago Nov. 2-8.

The events are sponsored by the American Society for Metals. Also participating in the week's activities and holding technical sessions of their own will be the Institute of Metals Division of the American Institute of Mining, Metallurgy and Petroleum Engineers, and the Society for Non-Destructive Testing. Other co-operating groups will be the Special Libraries Association, the Metal Powder Association, and the Industrial Heating Equipment Association.

The Metal Show, with nearly 500 exhibitors, will cover 200,000 square feet of floor space in Chicago's International Amphitheatre. It will open Monday, Nov. 4, and continue through Friday. The ASM two-day special metallurgical seminars start Nov. 2, and the World Metallurgical Congress will open the evening of Nov. 3. Director general of the World Congress in Dr. Zay Jeffries, retired vice president of General Electric Co.

The ASM awards luncheon will be held Nov. 5. The annual meeting of the society is scheduled for Nov. 6 at which time the Campbell Lecture will be presented by Dr. Earl R. Parker, University of California, on "Modern Concepts of Flow and Fracture."

Teacher Gets Award

The gold medal and senior award of ASM goes this year to Dr. John Chipman, head, Metallurgical Dept., Massachusetts Institute of Technology, for his "gifted teaching and inspired research" which has helped lift metallurgy to a highly respected plane of science and engineering.

Dr. Tokuskicki Mishima, University of Tokyo, will receive the Albert Sauveur Achievement Award for his "perfection of strong permanent magnets."

The gold medal for the advancement of research will be presented to Roy C. McKenna, chairman, Vanadium Alloys Steel Co., Latrobe, Pa. William Hume-Rothery, lecturer in metallurgical chemistry, Oxford and the University of Sheffield, England, has been named recipient of an honorary life membership, and the Howe medal will go to Prof. F. N. Rhines, W. E. Bond, and M. A. Kissel, Carnegie Institute of Technology.

MARKS 60 YEARS AT CONNECTICUT FOUNDRY

THE CONNECTICUT Yankee is noted the world over for his stability, craftsmanship, and his ability to stick to a job. Such a man is Jacob M. Bauer, who has just marked the 60th anniversary of his employment at the 103-year-old Malleable Iron Fittings Co., Branford, Conn.

Mr. Bauer went to work for MIF in 1897 as an inspector. Several years later he was raised to foreman of the hard iron inspection department, a position he held for many years. In 1941, when the malleable iron foundry was mechanized, he was made chief inspector, the position he now holds.

Born in New Haven, Conn., in 1871, Mr. Bauer and his wife, the former Geraldine Gilman, live in a pleasant old home in Granite Bay, where he is able to pursue his hobby of gardening. He is the father of 2 sons and 2 daughters, and the grandfather of 13.

Jacob M. Bauer, right, with President T. F. Hammer, Malleable Iron Fittings Co., Branford, Conn.

Circle 716 on Page 51→

Save by using specialized refractories

Many refractories problems in metal-working furnaces have been solved *economically* by the use of B&W specialized refractory castables. Each ferrous or non-ferrous furnace application requires a specific combination of properties to meet the service conditions. Whether your problem is high temperatures, abrasion and erosion, slag attack or the need for insulation, to name a few, you will find the refractory castable best suited to your requirements in B&W's line. Shown here in digest form are data on the widely used B&W refractory castables for metal-working furnaces:

B&W Refractory Castables for Metal Working Furnaces

	Temp. F	PROPERTIES	TYPICAL APPLICATIONS
B&W Kaocast	3000	**High resistance to spalling and slag attack. Low volume change and negligible reheat shrinkage.**	**Soaking pit covers, linings of high temperature heating and forging furnaces, burner blocks, electrode linings of electric furnace roofs, linings of non-ferrous metal furnaces.**
B&W Kaocrete 32	3200	High strength, exceptional refractoriness, unusual volume stability, excellent resistance to spalling.	Can be used in applications similar to those of B&W Kaocast and where higher refractoriness is required.
B&W Kaocrete D	2500	**Sufficient strength and hardness to withstand abrasion, considerable physical abuse and erosion.**	**Aluminum melting furnaces, linings and car tops in heat treating furnaces, as well as in sections of a wide variety of furnaces that are subject to scraping by hand tools or other mechanical abuse.**
B&W Kaocrete A	2600	Resists reducing atmospheres. Has good resistance to erosion, abrasion and thermal shock.	Annealing furnace bases and other applications where resistance to reducing atmospheres is essential. Also as a general purpose castable for linings in medium temperature service.
B&W Kaocrete B	2300	**Has an adhesive plastic texture particularly suited for vertical or overhanging constructions. Excellent for plastering.**	**Patching linings and baffles and for any application where plastering rather than gunning or casting is required.**
B&W Kaocrete LI	2700	High alumina content, exceptionally high strength for resistance to abrasion and erosion.	Aluminum furnace linings where high alumina content is important.
B&W Kaolite 20	2000	**Offers castable's fast, low cost installation plus insulation. Has refractoriness, light weight and low heat conductivity and, in addition, will resist reducing atmospheres. Can be poured or gunned.**	**Aluminum melting, heating and heat-treating, annealing and forge furnaces. Also for general maintenance and patching.**
B&W Kaolite 22	2200	**Has the same properties as B&W Kaolite 20. Can be used for higher temperatures but not in reducing atmospheres.**	

Send for your copy of B&W Bulletin R-35. It gives additional information on B&W's versatile refractory castables.

B&W REFRACTORIES PRODUCTS: B&W Allmul Firebrick • B&W 80 Firebrick • B&W Junior Firebrick • B&W Insulating Firebrick • B&W Refractory Castables, Plastics and Mortars • B&W Silicon Carbide

BABCOCK & WILCOX

THE BABCOCK & WILCOX CO.
REFRACTORIES DIVISION
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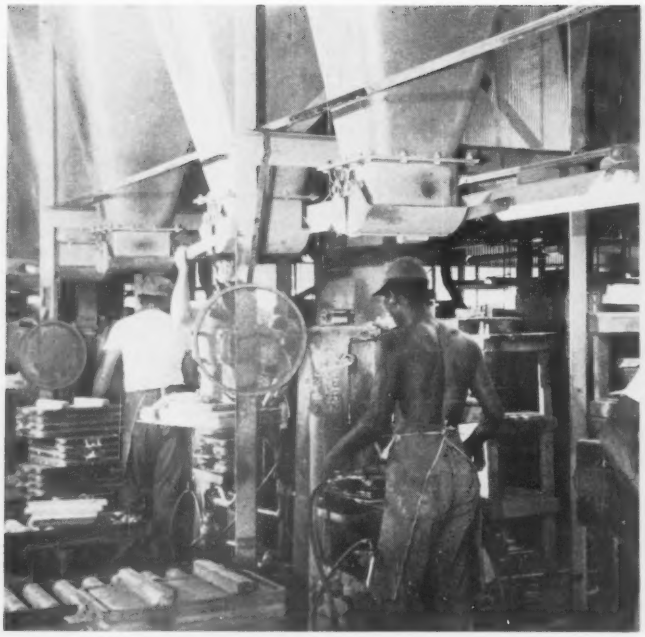
R561



Eye screws are made on 15 squeezer-type molding machines at the rate of 21 per hour per molder. Each mold contains 12 castings

A 40-ft roller conveyor moves the 50-lb molds to the pouring line

Foundry Casts

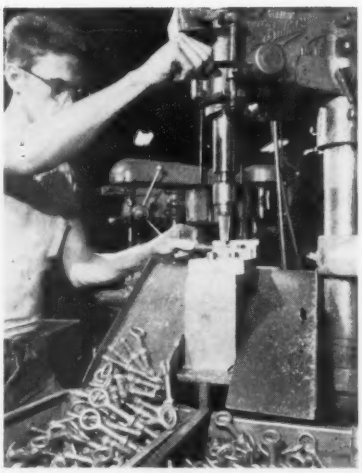
EYE SCREWS BY THE THOUSANDS

Molds are shaken out over a grid above a conveyor belt below floor

CELEBRATING its 50th anniversary this year, A. B. Chance Co., Centralia, Mo., manufactures some 2500 products, including nonferrous castings, for the electrical and communications industries.

One of the company's products is power line tap clamps, which enable linemen to tap safely onto power lines carrying as much as 23,000 volts. A vital part of each clamp is an eye screw, weighing a little less than 4 oz, used to attach and tighten the clamp to the line. These eye screws are cast by the thousands in Herculoy, a silicon-bronze alloy produced by Federated Metals Division, American Smelting & Refining Co., New York. Chance used approximately 825,000 lb of the metal last year.

Metal is melted in gas-fired reverberatory furnaces at 2150° F. A 600-



About 1500 screws per hour are reamed on line of drill presses

3 IMPORTANT REASONS WHY STEINEX IS YOUR BEST BUY IN BINDER!

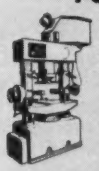
1 **YOU GET THE *BEST SHAKEOUT!***

2 **YOU GET THE *BEST BINDER . . .* FOR THE *LOWEST COST . . . BY FAR!***

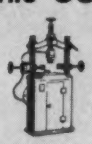
3 **YOU GET *CARVER SERVICE . . .* A BIG PLUS VALUE!**

When you buy Steinex, you get Carver experience and in-the-foundry know-how that will *show* you how to use STEINEX in your CO_2 operation successfully . . . and profitably!

Only CARVER Has Everything For the CO_2 Process!



CARVER V & S Core Shooters



CARVER Automatic Gassing Apparatus

KRAUSS Core Vents

CARVER Rapid Mullers

MAIL TODAY

CARVER FOUNDRY PRODUCTS CO.,
Muscatine, Iowa

RUSH information and prices on STEINEX binders.

NAME _____ TITLE _____

FOUNDRY _____

CITY _____ STATE _____

Circle 717 on Page 51

Arcair

SAVES FOUNDRY $30,000 A YEAR

Arcair Torches and Copperclad Electrodes are making this saving and increasing cleaning room productivity in a foundry on the East Coast.

Instead of grinding, chipping, and swing grinding, Arcair removes fins, defects, pads and heads. . .and 32⅓% more tonnage is produced with nine men as compared to 15 men and other methods.

For full information on ways Arcair can save you money and increase production, write now or call your Arcair Distributor.

Arcair COMPANY

465 S. Mt. Pleasant St. • Lancaster, Ohio

Circle 718 on Page 51

GOES OVER BIG for wheeling and dumping heavy materials

Costs Less per Year

Specify Sterling No. 119 HEAVY-DUTY CART
Pneumatic-tired wheels or steel wheels

Here's a cart that's "tailor-made" for wheeling coal, scrap, chips, turnings, borings and similar heavy materials. All-steel, completely welded and reinforced. Made extra strong and rugged for heavy-duty service. Dumps easily. Rests securely in any one of the three positions shown here. Available with steel wheels or pneumatic-tired wheels . . . plain or roller bearings.

Write for Bulletin or see nearest dealer.

Some areas open for dealerships. Write . . .

STERLING WHEELBARROW CO., Milwaukee 14, Wis.

A HALF CENTURY OF PROGRESS

Look for this Mark of STERLING Quality

Sterling WHEELBARROWS

A 7846-⅓R

Circle 719 on Page 51

lb charge of 50 per cent ingot and 50 per cent gates and sprues is melted in about 20 minutes. The alloy is said to have a low turbulency factor, does not contain oxide inclusions, solidifies relatively slowly and does not require additives. It also has excellent corrosion resistance and high torque strength.

Molds are made at the rate of 21 per hour per molder on a line of 15 squeezer-type molding machines. Aluminum matchplates are used. Each mold contains 12 eye screws and requires 50 lb of sand. Sand for each molding station is stored in a 2000-lb capacity overhead hopper. A 40-ft roller conveyor moves finished molds from each molder to the pouring line.

Shakeout Is Over Grid

Some 40 to 50 minutes after the molds have been poured, they are shaken out over a grid to a conveyor belt system which is below floor level and runs the length of the molding area. This sand then is taken by a bucket elevator up to the storage hopper, from which it goes into a mixer. Water is added as needed to bring the moisture content up to 6.8 per cent.

After mixing, the sand drops below the floor area into a second bucket elevator, is dumped onto another conveyor belt and carried to the hoppers at the molding machines. Excess is dumped into a bin at the end of the line.

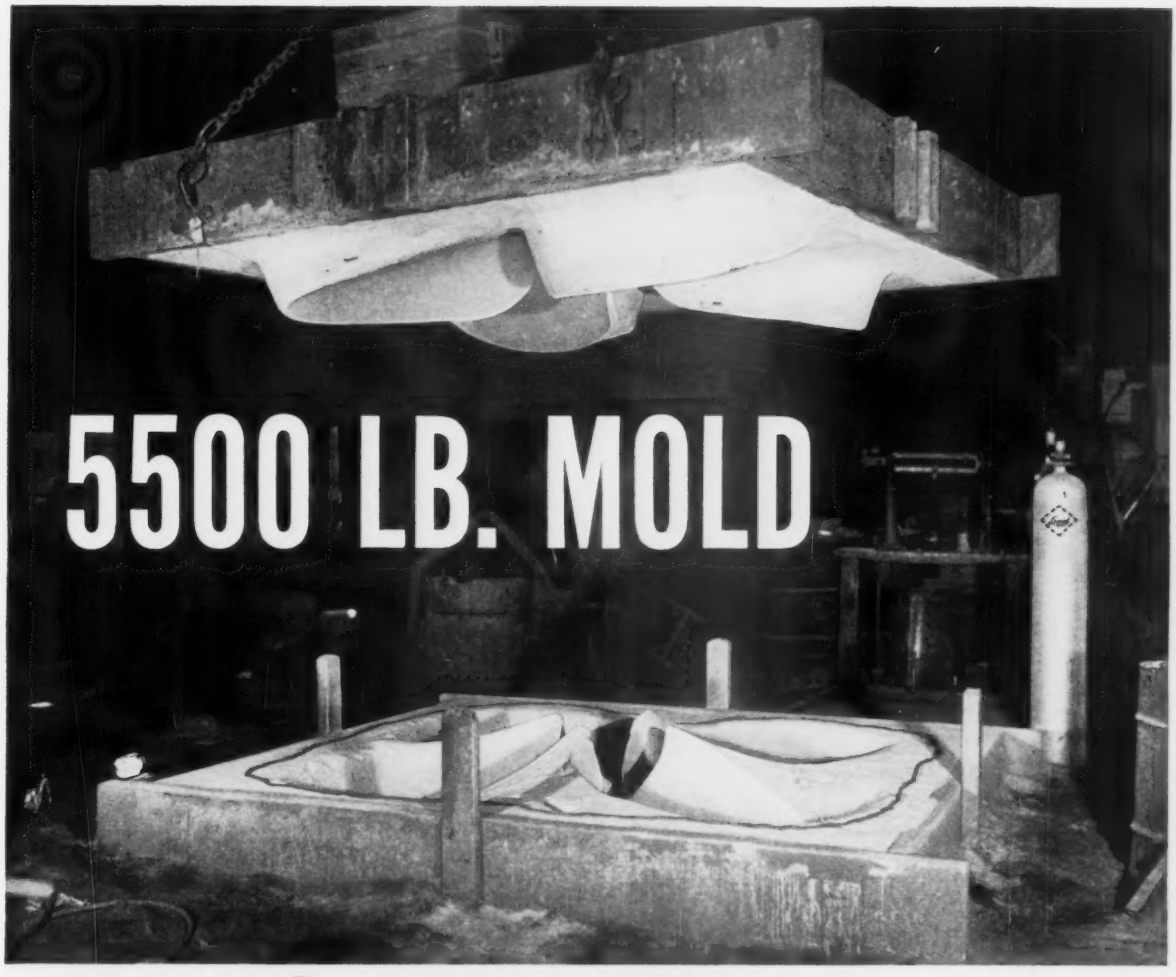
Castings are carted from shakeout to the cleaning section. Gates and sprues are cut off and returned to the furnaces for remelting and the castings are moved by conveyor to a tumbling-type, airless blast cleaning machine.

The following stop is a water-tumbling operation at which 6600 castings per hour are cleaned in a detergent and water solution to give the castings a smooth surface finish. This washing operation requires two hours. After inspection, satisfactory castings are placed in tote pans and sent to the grinding area, where burrs and other protrusions are ground down.

The castings then are moved to the machine shop. The eye is reamed on a drill press to a 3/4-in. allowance, at a rate as high as 1500 per hour. A turret lathe cuts the length and dimensions of shoulders, collars and faces. From the machine shop, castings go to final inspection and inventory.

Chance Co.'s nonferrous foundry can produce 6000 lb of brass or bronze, 2100 lb of aluminum and 2000 lb of contact copper castings in an eight-hour day.

CO_2 CURES



IN 40 MINUTES!

Fast, bakeless hardening of molds for large castings—like this one for 3400 pound nickel aluminum bronze propellers—is standard procedure at Columbian Bronze Corporation, Brooklyn, New York.

In addition to tremendous savings in time, Columbian Bronze reports these added advantages from CO_2 curing. no baking required • far fewer gaggers needed • elimination of need for extreme skill necessary in green sand molding • no danger of drops, soft spots or wet spots in mold • molds may be left for several days before pouring.

For complete facts and technical data on how CO_2 mold curing will revolutionize your operation, contact

World's Largest Producer of

THE LIQUID CARBONIC CORPORATION

3150 South Kedzie Avenue • Chicago 23, Illinois

Circle 720 on Page 51

The Bullard Company

cleans large castings 5 times faster with WHEELABRATOR®

A Room with a View . . . For Savings. That's this Wheelabrator Car-Type Room in the new $7,000,000 gray iron foundry of The Bullard Company. Large, heavy, bulky castings are cleaned in minutes instead of the hours required by manual blasting resulting in an immediate daily savings of two cleaning shifts. Foundry Supt. Stanley H. Bullard sums up the tremendous cleaning performance of this airless blast cleaning room in this manner, "We're tickled to death with it. The ricocheting of Wheelabrator Steel Shot cleans many interior areas we didn't expect it to reach."

There's a Wheelabrator machine for every foundry cleaning problem. Write today for information.

Ideas in action are pictured and explained in this catalog on Wheelabrator Rooms. Write today for Catalog No. 854.

WHEELABRATOR
CORPORATION
505 South Byrkit Street, Mishawaka, Indiana

WORLD'S LARGEST MANUFACTURER OF AIRLESS BLAST CLEANING EQUIPMENT

Foundry Statistics

ALUMINUM

(Shipments of castings—1000 pounds[1])

	Shipments				Unfilled Orders[2]
	Total	Sand	Perm. Mold	Die	
1955	827,162	165,482	298,349	355,203	.....
1956					
July	52,420	12,412	16,388	23,501	106,620
7 mo.	462,476	104,148	147,149	210,348	.....
Aug.	60,839	13,113	18,067	29,563	109,352
Sept.	61,942	12,367	17,855	31,649	111,785
Oct.	73,415	14,402	21,120	37,792	110,818
Nov.	69,058	14,346	20,673	33,938	113,356
Dec.	66,951	13,405	20,557	32,940	118,185
Total	794,581	171,181	245,421	376,230	.....
1957					
Jan.	72,999	14,201	20,963	37,194	116,088
Feb.	69,451	13,366	21,707	34,311	107,869
Mar.	74,527	13,914	22,974	37,521	107,963
Apr.	68,284	14,287	20,376	33,493	98,113
May	65,108	12,705	20,708	31,602	94,748
June	58,547	11,585	17,180	29,700	88,086
July	53,494	11,594	16,496	25,339	91,210
7 mo.	462,410	91,652	140,404	229,160	.....

MALLEABLE IRON

(Shipments of castings—net tons[1])

	Shipments		Standard		Pearlitic		Unfilled Orders[2]
	Total	For Sale	Total	For Sale	Total	For Sale	
1955	1,104,775	652,552	.....	.....	.....	.....	.....
1956							
July	54,340	31,300	45,977	26,881	8,363	4,419	92,078
7 mo.	567,469	329,789	490,024	273,767	77,445	43,304	.....
Aug.	74,422	43,479	62,867	36,759	11,555	6,720	91,883
Sept.	69,380	41,902	59,071	35,534	10,309	6,368	92,553
Oct.	81,528	50,219	68,769	43,109	12,759	7,110	92,734
Nov.	82,717	47,979	68,549	40,107	14,168	7,872	89,977
Dec.	76,352	44,268	63,625	37,569	12,727	6,699	92,311
Total	951,868	557,636	812,905	466,845	138,963	78,073	.....
1957							
Jan.	85,977	51,508	71,689	43,401	14,288	8,107	93,886
Feb.	78,028	46,729	65,411	39,590	12,617	7,139	90,725
Mar.	78,013	48,311	64,560	23,915	13,453	7,666	89,431
Apr.	80,271	51,320	65,990	42,810	14,281	8,510	83,116
May	76,504	46,277	63,058	38,072	13,445	8,205	79,787
June	72,556	44,639	59,829	36,892	12,727	7,747	76,331
July	57,748	34,876	45,101	27,290	12,648	7,586	80,694
7 mo.	529,097	323,660	435,638	251,970	93,459	54,960	.....

COPPER-BASE ALLOY

(Shipments of castings—1000 pounds[1])

	Shipments			Unfilled Orders[2]
	Total	Sand	Perm. Mold	
1955	1,008,898	905,867	63,111	.....
1956				
July	60,925	55,029	3,193	59,661
7 mo.	597,466	535,160	37,800	.....
Aug.	77,619	70,479	3,805	56,361
Sept.	72,109	64,887	3,930	56,990
Oct.	81,049	73,058	4,104	54,363
Nov.	72,866	65,022	4,114	52,643
Dec.	65,197	57,931	3,769	56,556
Total	966,306	866,545	57,522	.....
1957				
Jan.	82,025	73,202	4,510	57,422
Feb.	72,084	64,346	4,188	54,133
Mar.	77,418	69,258	4,445	49,135
Apr.	77,167	69,141	4,316	48,148
May	75,347	67,251	4,421	46,791
June	70,959	63,910	3,590	44,232
July	60,776	54,942	3,010	44,250
7 mo.	515,776	462,050	28,480	.....

MAGNESIUM

(Shipments of castings—1000 pounds[1])

	Shipments		Unfilled Orders[2]
	Total	For Sale	
1955	27,854	25,294	....
1956			
July	2,810	2,666	7,937
7 mo.	20,902	19,343	....
Aug.	3,059	2,860	8,201
Sept.	3,079	2,863	8,193
Oct.	3,442	3,187	7,893
Nov.	2,892	2,715	7,984
Dec.	2,794	2,612	7,616
Total	36,168	33,580	....
1957			
Jan.	3,207	3,017	8,245
Feb.	2,661	2,473	8,276
Mar.	2,970	2,804	7,690
Apr.	2,896	2,723	7,542
May	2,832	2,706	7,188
June	2,973	2,817	6,765
July	2,544	2,384	6,964
7 mo.	20,083	18,924	....

PRODUCTION WORKERS

Estimated Number

	June 1957	May 1957	June 1956
Ferrous	197,900	198,400	205,900
Nonferrous	63,000	63,300	62,300

Average Weekly Earnings

Gray Iron	$4.20	$2.94	$2.42
Malleable Iron	$5.10	$4.10	$8.38
Steel	96.88	95.58	95.87
Nonferrous	91.66	90.63	87.05

Average Weekly Hours

Gray Iron	38.8	38.4	40.4
Malleable Iron	39.4	39.3	38.8
Steel	41.4	41.2	42.8
Nonferrous	40.2	40.1	40.3

Source: Bureau of Labor Statistics.

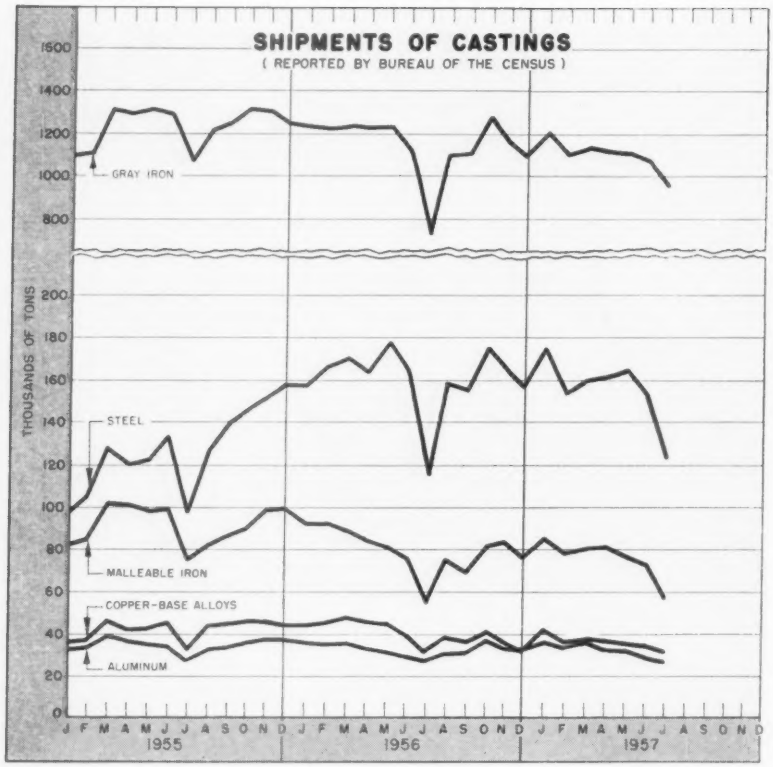
GRAY IRON CASTINGS—SHIPMENTS (Net tons[1])

	All Castings		Miscellaneous Castings		Heavy Steel Ingot Molds		Chilled Railroad Car Wheels	Pressure Pipe & Fittings	Soil Pipe & Fittings	Unfilled Orders[2]
	Total	For Sale	Total	For Sale	Total	For Sale	Total	Total[3]	Total[3]	
1955	14,837,745	7,987,205	9,161,685	3,715,963	2,739,864	1,392,209	385,041	1,681,630	869,558	.....
1956										
July	762,611	487,736	509,702	241,771	9,556	7,003	32,484	144,964	65,905	1,109,069
7 mo.	8,088,090	4,686,542	4,850,533	2,157,704	1,461,298	772,024	254,414	1,035,599	486,246	.....
Aug.	1,103,195	671,523	639,953	293,673	170,857	89,589	31,712	180,249	80,424	1,074,461
Sept.	1,109,943	648,784	623,743	282,824	233,823	117,708	35,361	151,081	65,935	1,037,283
Oct.	1,274,734	734,384	749,200	331,069	252,203	134,265	30,978	171,377	70,976	996,351
Nov.	1,175,572	634,856	720,263	303,938	251,262	131,321	27,852	116,157	60,038	916,723
Dec.	1,108,993	587,046	681,834	281,527	254,703	136,584	25,874	92,439	54,143	920,034
Total	13,860,527	7,963,135	8,265,526	3,650,735	2,624,146	1,381,490	406,191	1,746,902	817,762	.....
1957										
Jan.	1,213,215	642,317	761,697	320,058	261,961	136,456	31,139	101,069	57,346	904,860
Feb.	1,103,118	582,010	705,585	302,514	230,126	115,525	30,079	89,146	48,182	931,054
Mar.	1,133,146	604,481	713,767	305,104	214,775	98,694	36,995	108,158	59,451	934,847
Apr.	1,120,349	611,443	699,395	298,319	192,199	88,390	36,979	128,710	63,066	899,074
May	1,112,096	625,496	674,460	291,557	192,336	92,659	34,406	141,685	69,209	879,825
June	1,058,464	599,494	630,513	274,115	193,640	94,860	32,087	131,360	70,864	853,012
July	954,102	523,489	565,897	243,187	190,434	86,795	31,209	106,532	60,030	879,976
7 mo.	7,694,490	4,188,730	4,751,314	2,034,854	1,475,471	713,379	232,894	806,660	428,148	.....

STEEL CASTINGS—SHIPMENTS (Net Tons[1])

	All Castings			Carbon			Alloy			Unfilled Orders[2]
	Total	For Sale	Railway Specialties	Total	For Sale	Railway Specialties	Total	For Sale	Railway Specialties	
1955	1,530,694	1,166,706	236,880	1,088,489	814,258	219,602	445,769	354,452	17,278	.....
1956										
July	117,984	96,350	19,833	88,971	72,837	18,545	29,013	23,513	1,288	611,233
7 mo.	1,118,641	875,317	205,331	834,050	646,622	161,770	284,591	228,695	13,461	.....
Aug.	159,831	127,001	32,965	119,025	94,257	30,601	40,806	32,744	2,364	586,496
Sept.	155,046	121,705	33,496	116,905	91,266	31,314	38,141	30,439	2,182	562,937
Oct.	175,630	135,798	34,762	132,250	101,961	32,743	43,380	33,837	2,019	558,478
Nov.	164,114	126,900	28,284	122,212	93,262	26,436	41,902	33,638	1,848	545,862
Dec.	158,725	125,569	34,080	120,326	94,741	32,227	38,399	30,828	1,853	521,782
Total	1,931,987	1,512,290	368,918	1,444,768	1,122,109	345,091	487,219	390,181	23,827	.....
1957										
Jan.	169,240	133,826	30,090	125,389	98,533	27,739	43,851	35,293	2,351	519,575
Feb.	154,932	121,667	27,181	114,805	89,480	25,060	40,127	32,187	2,121	511,806
Mar.	160,054	124,416	29,968	121,089	93,466	27,683	38,965	30,950	2,285	503,407
Apr.	162,498	124,549	29,708	122,894	93,512	27,624	39,604	32,037	2,084	497,632
May	164,575	125,431	32,840	124,840	94,635	30,926	39,735	30,796	1,914	504,990
June	153,647	119,353	31,338	116,759	91,009	28,766	36,888	28,344	2,572	494,267
July	122,018	90,037	22,803	91,730	67,719	21,426	30,288	22,318	1,377	489,390
7 mo.	1,086,964	839,279	203,928	817,506	628,354	189,224	269,458	211,925	14,704	.....

[1]Source: Bureau of Census. [2]For sale only. [3]All cast iron pipe is shipped for sale.


SHIPMENTS OF CASTINGS
(REPORTED BY BUREAU OF THE CENSUS)
THOUSANDS OF TONS
GRAY IRON
STEEL
MALLEABLE IRON
COPPER-BASE ALLOYS
ALUMINUM
J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D
1955
1956
1957

COKE PRODUCTION AND CONSUMPTION

(Net tons*)

	Production	Consumption Total	Consumption By Foundries
1955	75,150,247	76,266,385	3,154,052
1956			
July	2,301,442	1,596,570	193,431
7 mo.	42,183,456	40,470,550	1,701,160
Aug.	5,614,997	5,281,627	225,978
Sept.	6,453,229	6,609,309	211,015
Oct.	6,742,483	6,951,386	253,147
Nov.	6,328,272	6,681,074	237,330
Dec.	6,615,935	6,959,900	224,452
Total	73,938,372	72,953,846	2,853,082
1957			
Jan.	6,857,640	7,096,024	241,014
Feb.	6,211,845	6,302,583	228,569
Mar.	6,894,121	6,803,311	232,266
Apr.	6,436,273	6,396,900	226,698
May	6,632,519	6,521,817	219,675
June	6,362,335	6,318,339	188,487
July	6,501,915	6,378,940	180,360
7 mo.	45,899,648	45,817,914	1,517,069

INGOT BRASS AND BRONZE

(Shipments in net tons)

	1956	1957
Jan.	27,736	25,681
Feb.	24,949	20,769
Mar.	28,310	21,948
Apr.	25,808	23,507
May	23,437	22,037
June	18,842	18,888
July	17,364	16,695
Aug.	23,812	19,654
Sept.	20,929	.....
Oct.	23,045	.....
Nov.	21,818	.....
Dec.	18,046	.....
Total for year	274,096	.....

Source: Defense Council of the Ingot Brass and Bronze Industry.

ZINC-BASE ALLOY

(Shipments of castings—1000 pounds[1])

	Shipments Total	Shipments For Sale	Unfilled Orders[2]
1955	778,000	493,244	.....
1956			
July	42,699	27,773	64,806
7 mo.	404,177	262,160	.....
Aug.	52,793	33,753	73,411
Sept.	46,811	31,438	79,390
Oct.	65,921	42,411	75,106
Nov.	65,443	40,189	74,623
Dec	58,583	36,562	75,293
Total	693,728	449,516	.....
1957			
Jan.	67,964	42,189	75,503
Feb.	59,793	36,580	74,739
Mar.	61,378	40,593	64,466
Apr.	54,982	34,801	59,534
May	53,565	35,676	66,712
June	49,356	33,206	64,137
July	48,379	29,418	64,043
7 mo.	395,417	252,463	.....

INDEX OF FOUNDRY EQUIPMENT ORDERS

Foundry Trades Only

(Net Orders Closed, New Equipment)

	1956	1957
Jan.	195.6	117.9
Feb.	169.0	188.4
Mar.	152.7	127.0
Apr.	135.2	101.1
May	207.0	136.2
June	156.7	187.5
July	110.3	98.6
Aug.	188.3	....
Sept.	114.7	....
Oct.	122.2	....
Nov.	121.0	....
Dec.	115.6	....

Note: Figures are percentages of the base period 1947-49 taken as 100 per cent monthly average. This is a new base period. Source: Foundry Equipment Manufacturers Association.

IRON AND STEEL SCRAP CONSUMPTION

(Gross tons*)

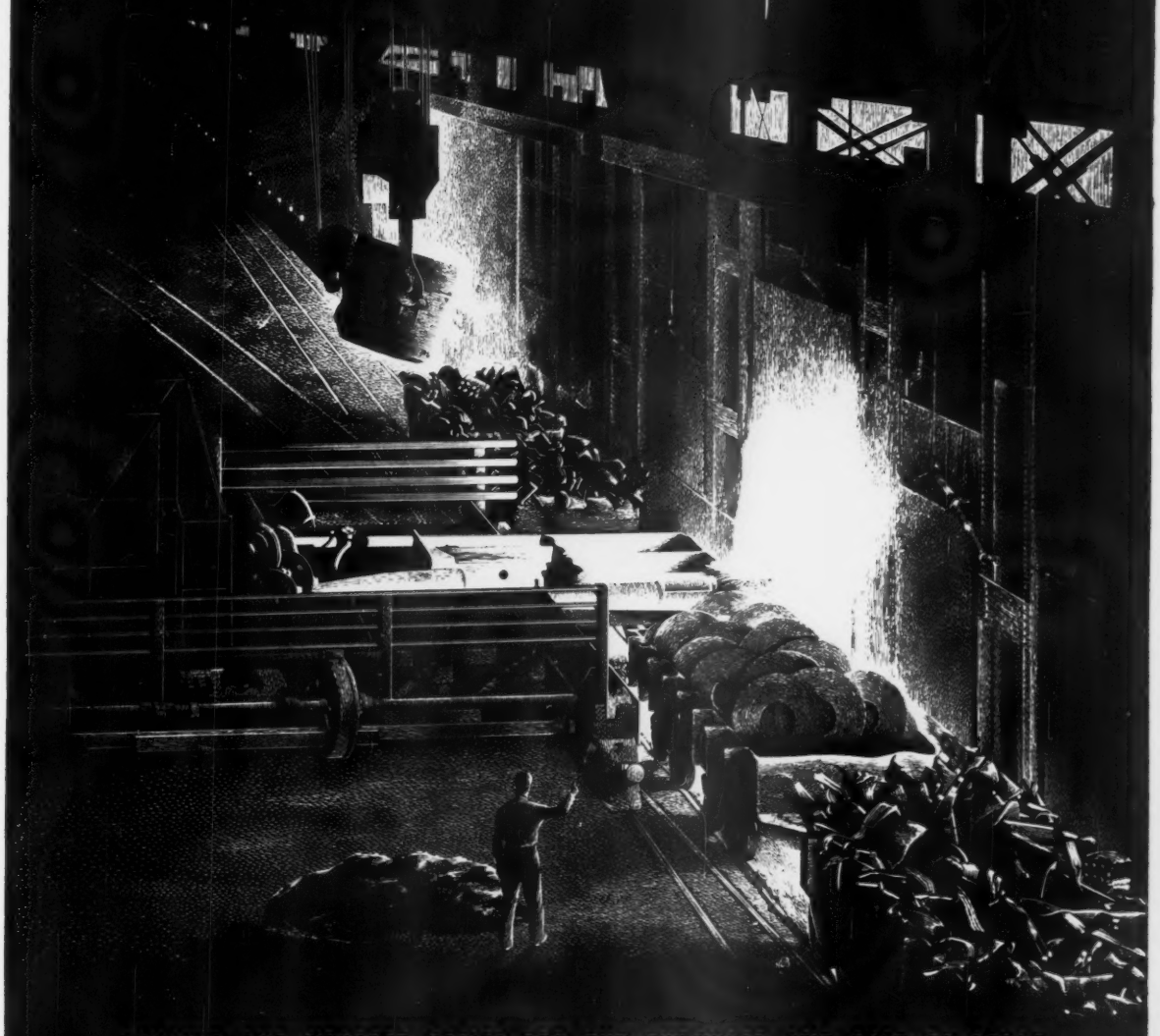
	All Scrap Total	By Types of Furnace: Cupola Total	Air Total	Electric Total
1955	72,654,925	10,786,957	1,273,470	8,757,593
1956				
June	5,994,989	776,299	87,525	831,456
6 mo.	38,744,710	5,219,025	620,707	5,152,230
July	1,986,613	621,064	56,071	399,441
Aug.	5,453,927	803,123	92,200	807,131
Sept.	6,231,017	738,824	84,627	841,783
Oct.	6,722,320	890,389	101,773	935,008
Nov.	6,305,947	822,542	95,890	875,524
Dec.	6,264,955	722,320	82,160	851,770
Total	71,709,489	9,817,287	1,133,128	9,862,887
1957				
Jan.	6,630,804	874,764	102,782	927,499
Feb.	6,038,436	804,185	93,902	834,843
Mar.	6,294,038	814,372	92,534	903,149
Apr.	5,816,309	835,027	97,289	807,922
May	5,753,435	812,141	92,260	786,210
June	5,430,607	744,790	80,063	705,590
6 mo.	35,983,629	4,885,279	558,830	4,965,213

PIG IRON PRODUCTION AND CONSUMPTION

	Production** (Standard grades—net tons) Total	Foundry	Malleable & Silvery	Basic	Low Phos. Intermediate Low Phos. & Bessemer	Consumption* (By type of furnace—gross tons) Total	Cupola	Air	Electric
1955	77,114,073	2,858,957	3,884,971	62,570,394	7,799,751	68,944,698	5,326,534	260,008	246,406
1956									
July-Aug.	6,191,039	337,077	382,633	4,854,879	616,450	963,749	303,341	14,702	5,582
8 mo.	46,921,603	1,630,268	2,418,254	38,381,723	4,541,358	37,211,343	2,809,778	155,678	118,318
Sept.	6,873,352	236,809	316,590	5,636,288	683,665	4,618,718	404,948	22,719	17,604
Oct.	7,246,650	245,762	321,188	6,001,279	678,421	6,053,147	366,848	19,642	18,239
Nov.	6,977,457	140,277	354,573	5,831,885	664,051	6,450,404	446,449	22,548	19,064
Dec.	7,268,743	149,745	322,631	6,099,101	697,266	6,237,538	391,632	21,557	17,161
Total	75,301,134	2,402,861	3,733,258	61,900,276	7,264,761	60,571,150	4,419,655	242,144	190,386
1957									
Jan.	7,209,547	135,608	344,073	6,081,137	648,699	6,482,472	423,660	22,989	20,431
Feb.	6,596,133	154,543	294,491	5,414,732	730,794	5,860,099	369,206	20,743	19,443
Mar.	7,179,100	168,650	347,451	6,008,135	654,864	6,155,334	370,915	20,241	23,259
Apr.	6,810,102	162,023	329,180	5,686,507	632,392	5,586,587	369,359	20,495	19,756
May	6,877,052	258,638	313,583	5,720,212	584,619	5,862,966	362,085	19,201	17,869
June	6,593,326	243,789	318,906	5,436,203	594,428	5,672,086	335,574	17,044	17,744
July	6,625,901	221,929	336,590	5,515,736	551,646	.....	.....	.....	.....
Aug.	6,719,763	228,378	298,269	5,451,691	741,425	.....	.....	.....	.....
8 mo.	54,609,321	1,573,558	2,582,543	45,314,353	5,138,867	.....	.....	.....	.....

*Source: U. S. Dept. of Interior, Bureau of Mines. **Source: American Iron & Steel Institute. [1]Source: Bureau of the Census. [2]For Sale only.

for the purchase or sale of **scrap**



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LEADERS IN IRON AND STEEL SCRAP SINCE 1889

Circle 723 on Page 51

Portable dynamometer is used to measure weight of metal in a ladle. Shield protects it

In this application, portable dynamometer registers weight of material lifted by a crane

Portable Dynamometers

Handle Many Weighing Jobs

By **EARL L. LAPP**
Engineering Consultant
W. C. Dillon Co.
Van Nuys, Calif.

POSITIVE means of load determination can be a major deterrent to safety hazards. Where loads placed on equipment and structural members vary over a wide range, maintaining a constant check on stresses is desirable in order to keep wthin safety factor limits.

Although proper pretesting of load-carrying members before they are used is effective in preventing subsequent failure and resulting hazards, it is not always sufficient. Constant observation of dynamic, fluctuating loads aids in reducing or eliminating injuries which otherwise might occur in inadvertant overloading of structural elements. Even the most experienced machinery operator should not be required to use only his own judgment in determining safe loading when simple mechanical means of accurate observation of safe loads are available.

Two needless accidents illustrated in the following examples occurred when a human estimate instead of accurate measurement was used in load-lifting applications.

A few years ago a worker was painfully injured when a hoist cable snapped during lifting of a weight greater than that of the maximum permissible load. Some castings stored in a container were to be moved inside the manufacturing plant.

From his previous experience, the operator estimated the size of the load and selected the proper hoist to be used. An accumulation of rainwater not visible in the bottom of this container caused the weight within the container to be more than doubled.

Another instance of a more serious nature in incorrect weight estimating occurred in the lifting of a massive I-beam whose weight was almost trebled by unnoticed wedging of one end of the lower flange between adjacent beams. The resulting excessive load caused the crane to topple over, fatally injuring its operator.

In both of these instances, reliance was placed on the estimate of experienced operators. However, if the crane or hoist operators had had a visual, accurate means of determining actual loads, overweight would have been apparent and these accidents would not have occurred.

A recent study of measuring methods for dynamic tension loads made in a number of plants throughout the country reveals the increased use of a small, portable measuring device which makes use of a dynamometer to indicate exact loads directly. Simple, compact and versatile, these devices are particularly well suited to accurate measurement of fluctuating weight or tension, even when the load to be checked is difficult to handle.

Dynamometers shown in the accompanying illustrations are mounted as an integral part of the load carrying portion of the equipment. They also are placed where they can be observed constantly by the hoisting equipment operator.

A dynamometer operates through the deflection of a high-alloy steel beam which requires only 0.040-in. over-all movement to indicate a full-scale reading. Thus, mechanical devices used in conjunction with the dynamometer do not require an extended range of travel. Since there are no levers or weights to adjust, loads are indicated immediately in pounds on the dial face. Regardless of the position in which the instruments are used, they maintain consistent, accurate readings for low, medium and high load-measuring applications.

No. 8® GRAPHITIZER

TREATS GREY IRON EFFECTIVELY FOR LESS THAN 10¢ PER TON!

Thousands of foundries are already employing No. 8 because it is such an amazingly simple and accurate graphitizer. No. 8 is a powerful inoculant. It plants graphite *throughout* the molten metal. No. 8 gives castings a higher machinability rating. It reduces chill and hardness in thin sections and improves wear and shock resistance. No. 8 makes castings more metallurgically uniform and, most important of all, No. 8 graphitizer *substantially reduces the cost of metal control* (cost figures in several foundries are below 10¢ per ton of metal treated). No. 8 is easy to apply by funnel or envelope method. As the photomicrographs shown here indicate, No. 8 is effective for special metallurgical control. From every standpoint it will pay you to use No. 8, regularly. For further details write for Engineering Bulletin No. 2.

Base Iron

Photomicrograph from broken half of 1.25 arbitration bar of gray iron not treated with No. 8 Cupola charge was made up of 48% steel, 33% cast scrap, 19% malleable pig iron and 45 lbs. of silicon briquettes. Total charge was 2544 lbs. This iron tested to the following physical properties: Transverse Strength 2,497 lbs. (wedge bar) • Brinell Hardness 229 (wedge bar) • Total Chill Depth 41/32 in., Clear Chill 26/32 in. • Deflection 0.23 in.

Note how the iron treated with No. 8 has increased in deflection. Usually iron treated with No. 8 will show an increase from 10% to 30% in deflection over the base iron value—this means less cracked castings and more serviceable metal.

Treated Iron

Photomicrograph from broken half of arbitration bar of same base iron treated with 1 lb. per ton of No. 8. Holding time in ladle following addition of Graphite was less than 8 minutes. Note how the addition of No. 8 has destroyed the dendritic pattern and has given a normal flake pattern. The treated iron tested to the following physical properties: Transverse Strength 2,970 lbs. (wedge bar) • Brinell Hardness 217 (wedge bar) • Total Chill Depth 13/32 in., Clear Chill 10/32 in. • Deflection 0.31 in.

GF240-1

THE UNITED STATES GRAPHITE COMPANY

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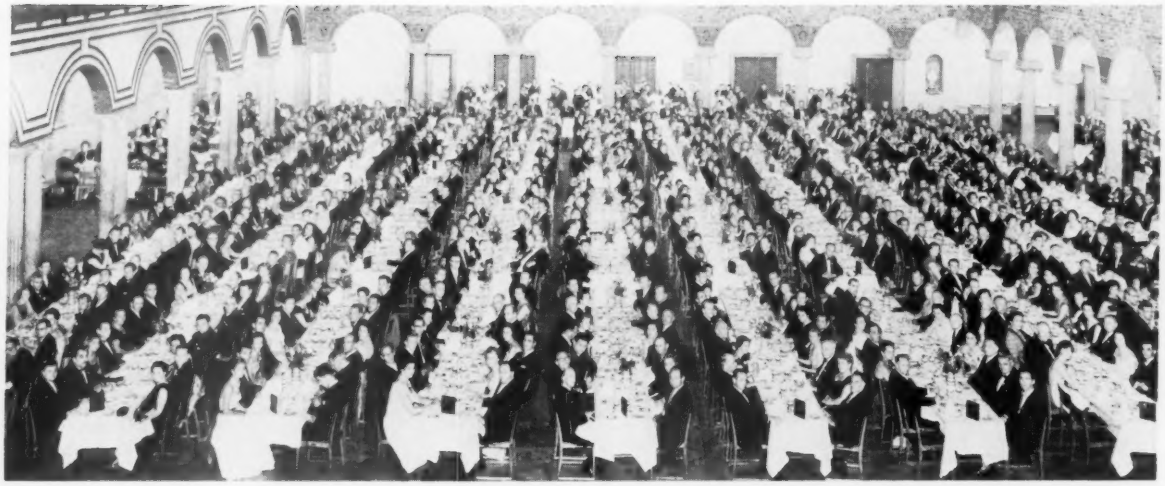
Circle 724 on Page 51



More than 1000 persons attended the banquet at Stockholm's Town Hall, which is an outstanding architectural feature of the city

TECHNICAL PAPERS

At the International Foundry Congress

By VINCENT DELPORT
European Editor

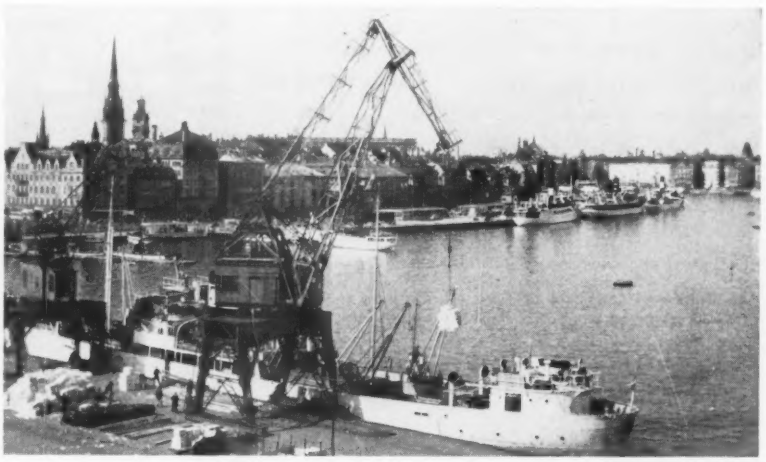
OF 28 papers presented at the International Foundry Congress at Stockholm Aug. 19-24, 13 were exchange papers from member associations of the International Committee. Subjects covered included gray iron, nodular iron, malleable iron, steel, light alloys, cupola practice, melting furnaces, coremaking, metallurgy, general foundry practice, ventilation, and conditions of work.

Iron Castings—The exchange paper from the Austrian foundry technical association was "The Velocity of Sound as a Characteristic Value of the Quality of Cast Iron," by Rolf Ziegler and Richard Gerstner, Austrian Foundry Institute. The authors indicate relations which enable the following characteristics to be determined by ultrasonic tests: Amount and fineness of graphite; degree of saturation ; tensile strength; disintegration of the texture; percentage of spherolites in spheroidal graphite iron. This method reportedly can be used for other metals and materials.

A contribution from the Spanish Iron and Steel Institute dealt with "The Study of the Pearlitic Matrix of Cast Iron," by J. Navarro Alcacer and Luis Froufe. The authors have derived a relationship between the Brinell hardness of the matrix and the graphite notch factor. Statistical microhardness measurements of pearlite grains were made in 30-mm-diam test bars of chemical compositions represented by a saturation index ranging from $S_c = 0.81$ to approximately 1 without showing any significant differences.

Conversely, cast iron hardness shows significant variations. Tensile strength estimates of these matrixes based on the above measurements and on the study of the appropriate parameters have not shown any noteworthy variations except for low saturation indexes. By comparing hardness and tensile strength values of gray iron and corresponding matrixes, the almost exclusive significance which the effect of graphite has on the reduction of strength and hardness was derived.

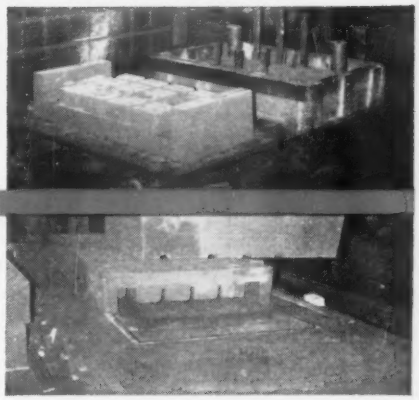
The Casting Institute of Japan ex-



View of Stockholm Harbor shows the quay at Stadsgarden

KOLD-SET®

The Original Kold Setting Binder



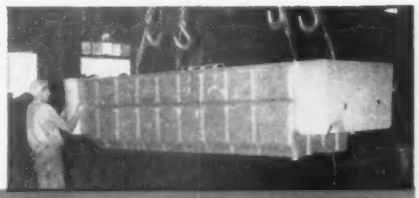
1500 lb. core made in 15 minutes—box drawn in 1 hour (can draw box sooner if required).

Core making time reduced 3 hours.

Slab cores located in drag—Six 1500 lb. KOLD-SET cores located in cope make up assembly for 17,000 lb. machine tool floor plate. Casting made entirely in KOLD-SET cores.

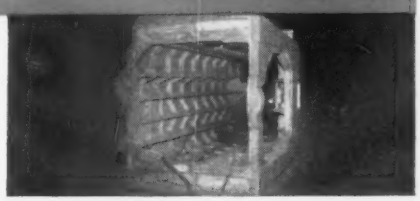
Finish cleaning time reduced 80%.

Consistent Quality at PRESCOTT COMPANY Menominee, Michigan



11,000 lb. core made in 30 minutes. Core box drawn one hour after it was started (2 coremakers). Double washed before oven drying 8 hours at 450°.

Core fell free of casting at shakeout.



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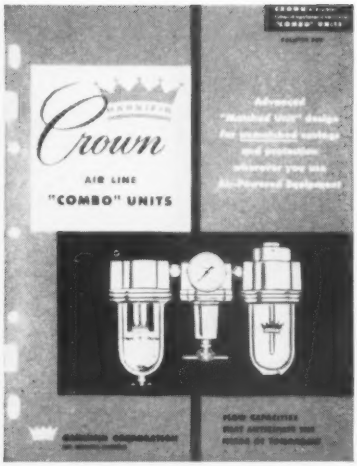
Circle 725 on Page 51



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Circle 726 on Page 51

change paper was "Oxidation of Molten Cast Iron," by Nobutaro Kayama, Waseda University, and Katsutoyo Noxaki, Mitsubishi Chemical Industries Ltd. The authors made studies to clarify the intrinsic nature of oxidation of molten cast iron and to establish a basic principle of melting to prevent casting defects by oxidation. Oxides in the iron were determined by the chlorine method and the type of oxide by the electron diffraction method. Influence of the oxide on microstructure and formation of shrinkage cavities was examined. In addition, cupola operations were carried out to corroborate results.

Results indicate that the oxide usually formed is silica. Suspension of silica brings about irregularity of microstructure of graphites and causes shrinkage cavity. Sound castings can be obtained by melting which prevents strong oxidation of the melt at low temperature, and then raising its temperature as high as possible.

Jorgen Drachmann, Foundryconsult Co., A.B., Sweden, contributed "Silicon Variations in Cast Iron Melted in Cupolas." Silicon content of the iron, measured at the spout of a continuously melting cupola at intervals of about two minutes, forms a time series with the following characteristics: 1. No appreciable trend appears as long as melting conditions remain constant. 2. No appreciable cyclic effect in relation to the charging period. 3. An oscillatory variation around a mean value obtained by deducting the silicon loss, if known, from the calculated mean silicon content of the charge.

Silicon Distribution Is Variable

Comparing this theory of time series with the melting process, the author finds a random variable in the distribution of the silicon within the charge, even if no significant variation exists in the distribution of silicon within the different charges. He also finds a variable average caused by the charge descending faster in the center of the cupola than at the sides and by the curvature at the upper part of the melting zone.

"Comparison of the Elastic Behavior of Gray Irons Under Static and Bending Stresses" was offered by P. le Rolland, Institut Superieur des Materiaux et de la Construction Mecanique, and Mme. E. Plenard, Centre Technique des Industries de la Fonderie. The authors point out that gray irons present certain peculiarities: Accommodation, perfect but not pure elasticity, and substantial hysteresis. As a result, classical determination of the Young modulus, which is a criterion of quality for these materials, is difficult. It is better to utilize methods which use low bending stresses.

The question is whether it is legitimate to take for granted the correlation of the modulus of tensile, compression, and bending elasticity. Theoretical considerations, backed by experimental results, give an affirmative answer, but some precautions must be taken to define the three values. Tests must be made close to a state of natural equilibrium. Restricted cycles about any given stresses give the same value. Study of straight line extrapolation curves used to determine the modulus of elasticity at stresses approximating zero has shown that the slope of such curves depends on damping capacity and structure of the iron under test.

Nodular Iron—Exchange paper of the Institute of British Foundrymen, "Properties Revealed by Tensile Tests on Pearlitic Irons," by G. N. J. Gilbert and K. B. Palmer, British Cast Iron Research Association, was one of two on nodular iron. At room temperature the strength of pearlitic nodular irons depends on the temperature of the ductile to brittle transition temperature. Materials with high transition temperatures have relatively low tensile strengths and elongations. Normalizing decreases transition temperature and improves tensile properties. Besides the influence of elements such as silicon and phosphorus, which raise transition temperatures, tensile strength at room temperature may be decreased considerably by a trace of tin or, to a somewhat lesser extent, arsenic.

Certain pearlitic nodular irons may exhibit brittleness at 300 to 600°C. All pearlitic nodular irons decrease in strength above about 300°C, and in certain irons the decrease in strength is not accompanied by any increase in elongation, as might be expected. These irons are said to exhibit brittleness at high temperatures. Other pearlitic nodular irons do not exhibit brittleness, but have high elongations and higher strength at high temperatures. It has been shown that arsenic or phosphorus above about 0.05 per cent is sufficient to produce superior high-temperature properties. At room temperature these elements tend to embrittle.

The second paper on nodular iron was by John Gittus, Mond Nickel Co., London, who discussed "The Influence of Heat Treatment on Impact Properties of Spheroidal Graphite Cast Iron." This iron in the fully annealed condition has excellent impact properties because of its low impact transition temperature. Specimens cooled rapidly from the ferritizing temperature (690°C) can be toughened by tempering for about one

hour at 300 to 350°C, which reduces their transition temperature by 20 to 30 degrees. Tempering for longer times or at higher temperatures causes temper embrittlement, particularly at about 410°C. In untempered specimens, ductile fracture follows the grain boundaries, exposing many graphite spheroids. In temper-embrittled specimens, a proportion of brittle grain boundary fracture occurs, irrespective of testing temperature, within the range from −75 to +100°C.

Ferrite grain size has been varied by annealing pearlite, bainite, and martensite at varying temperatures and for varying times. The finest ferrite grain size produced fully ductile fractures. Three methods of refining grain size have been defined—ferritization at a low temperature, such as 600°C; ferritization of an upper bainite instead of pearlite; and low-temperature austenitization. The finest ferrite is yielded by a combination of these conditions.

Malleable Iron—Bertil Thyberg, Husqvarna Vapenfabriks AB, Sweden, presented the single paper on malleable iron—"Some Steps in the Development of High-Duty Malleable Cast Iron." Until 1951, production by the author's firm was concentrated on a ferritic grade of malleable with a tensile strength of 61,200-65,470 psi with 11-15 per cent elongation. Various methods were tried to develop higher mechanical properties. Additions of 0.5 to 1 per cent copper were shown to be beneficial in obtaining greater strength.

The firm also made pearlitic malleable grades. For this production, the same base iron as for the ferritic grades and the same heat treatment cycle were used. The iron was alloyed with manganese in the ladle and in some cases with copper as well. Efficient spheroidization of the pearlitic matrix was achieved by a short reheating of the castings above the pearlitic range, rapid cooling, and immediate annealing just under the pearlitic range. With this additional treatment, mechanical properties were these: Ultimate tensile strength, 88,-180-95,290 psi; yield point (0.2 per cent proof stress), 53,800-59,700 psi; elongation, 5-8 per cent; and Erinell hardness, 195-230.

Steel—"Metallurgical Aspects of Hot Tearing in Cast Steel," by Kurt Beckius, Swedish Iron and Steel Society, was the only paper to deal with cast steel. The author studied the formation of hot tears in steel in an apparatus designed on the spring resistance principle. The resulting curves of the time-contraction process were compared to the tearing process as manifested in macroetched, tear-containing sections of cast test

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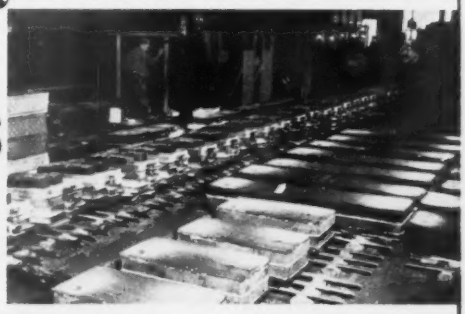

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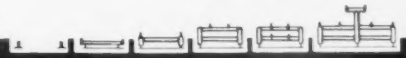

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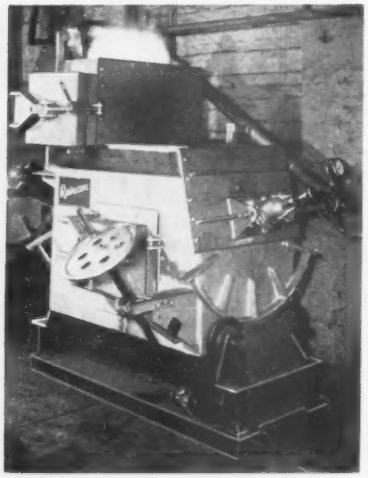

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bars, the contraction-retaining spring load of which was removed at different intervals after pouring. Results were supplemented by temperature measurements of the test bars during solidification and cooling. From these observations, an attempt was made to explain the relation between the solidification process and the hot-tear formation.

This explanation, to some extent similar to Pellini's film-stage theory, states that hot tears occur in the presence of liquid metal, but it gives a somewhat different view on the development of the tears and the temperature differences between surface and center of a casting during solidification. Steels with 0.19 to 0.32 per cent C have been found to be more prone to hot tearing than steels with lower or higher carbon content.

Light Alloys—The exchange paper of the Netherlands foundry association was "Aging of Aluminum-Magnesium Casting Alloys," by Leopold J. G. Van Ewijk, N. V. "Industrie." The author studied the influence of aging on mechanical properties and microstructure of aluminum-magnesium alloys containing 5 to 12 per cent Mg.

Aluminum ingots of two purities were used: One was of 99.73 per cent purity, as normally used in the foundry, and the other 99.992 per cent, or high purity. Purity of the magnesium ingots was 99.928 per cent. Sandcast test bars, cast to shape, were aged at temperatures to 175°C, for periods of 2 to 64 days, after which mechanical properties were determined at room temperature. To every aging series, an equal number of bars was added which, after homogenizing, underwent a cold deformation of 4 per cent elongation.

Results showed that aging is more severe and loss in mechanical properties greater as magnesium content rises. Less important, but very distinct, is the influence of purity, the higher purity alloy being the more resistant. Plastic deformation accelerates aging and causes an earlier loss of elongation. In these bars, the microscope indicated an earlier and more severe beta precipitation. Additional tests were performed on a 10.5 per cent Mg alloy to which a small dose of titanium plus boron was added. In these tests, homogenizing time was varied from 4 to 64 hours. No beneficial effect toward aging was observed.

Second of the two papers on light alloys, "The Scatter in Strength of Light Alloy Castings," was by Fred H. Turner, SAAB Aircraft Co., Sweden. The author subjected to statistical analysis the results of routine tensile tests on specimens machined from light alloy castings in normal production for use in aircraft. Two magnesium and two aluminum alloys were included. The investigation demonstrates that different alloys should have different factors of safety and that allowable design stresses can be raised for some of them.

Cupolas and Melting Furnaces—According to "Theory of Carbon Pickup in the Cupola," by Roman Krzeszewski, Institut Odlewnictwa, Poland, carbon pickup may be influenced in various ways. He found that speed of carbon diffusion from the carbonizer to the solution controlled carbon pickup of iron-silicon alloys, and he developed a carbon pickup equation. On the basis of this equation, he derived the following equation for carbon pickup in the cupola, the existence of an oxidizing atmosphere in the cupola being taken into consideration:

$$C_2 = C_\infty - (C_\infty - C_1) \cdot e^{-\bar{k}_1 \bar{\tau}_2}$$

C_1 is the carbon in the chargen C_2 the carbon in the cast iron; C_∞ the carbon in the cast iron which would be obtained if the carbon pickup process in the cupola lasted indefinitely; $\bar{k}_1$ the constant depending on the diffusion coefficient; and $\bar{\tau}_2$ the duration of the process. The author goes on to say that the formula given by Levi is a particular case of the formula cited above.

Exchange paper of the Finnish association was "The Melting Process and the Materials Balance of a Hot Blast Cupola," by Sven Forssell and Yrjo Ingman, Hogfors Bruk. The authors point out that fluctuations in the operation of the hot blast cupola are reflected in the temperature as well as in composition of the iron and analysis of the slag. The CO_2 content of the cupola gases can be taken as a basis for melting process control. An increase of CO_2 content shows that the existing cupola atmosphere is less reducing; consequently greater losses of silicon and carbon will result. At the same time, FeO content of the slag increases and temperature of the iron goes down.

Composition of the slag depends considerably on contact time with the coke in the cupola hearth. An average of 1.9 per cent FeO with 20-minutes' contact corresponds to an average FeO content of 0.8 per cent with one-hour contact.

"A New Hot Blast Cupola with Direct Recuperation of the Heat of the Exhaust Gases" was submitted by Georges Ulmer, Centre Technique des Industries de la Fonderie. The author refers to a new blast preheating method for cupolas which was developed at the research station of the Centre Technique with a 10-in. ID cupola.

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instruments for control and adjustment of combustion. Satisfactory performance on a semi-industrial scale induced the author to make industrial tests on a 20-in. ID cupola. Over a six-month run, the cupola gave the following results, compared with cold blast: 1. Melting capacity increased 30 per cent (2 tons against 1.5). 2. Coke consumption declined 25 per cent (9 per cent against 12 per cent in the charges). 3. Molten iron temperature increased 20 to 30 per cent.

Blast temperature is easy to control by the special instrument for regulating the recuperator draft, and cleaning and ash removal was practically nonexistent. The device is dependable and particularly suitable for small and medium-sized cupolas.

Dr. Ing. K. H. Brokmeier, Brown-Boveri Co., Germany, in a paper entitled "The Importance of Induction Furnaces for the Foundry," emphasized that development of induction crucible furnaces, especially for cast iron, has progressed so that valuable results are available as to their metallurgical characteristics and practical and economical use. He discussed analytical behavior of synthetic irons, the most favorable control of temperature, technique of operation, the principles of planning for various requirements, and economics of use.

Sand—Harry W. Dietert, Harry W. Dietert Co., Detroit, and president, American Foundrymen's Society, presented the exchange paper of the AFS, which was prepared in collaboration with Alex Graham and Randolph Dietert, also of his company. Subject was "Automatic Tempering of Molding Sand." The authors believe that a foundry can improve the consistency of casting quality greatly by furnishing molding sand of constant moisture to molders. The full benefit of an automatic sand tempering unit can be secured with sand mills that mix the sand sufficiently to distribute the water uniformly throughout the sand batch in the time allowed for the mixing cycle.

More emphasis should be placed on cooling sand so that it is delivered to molders at a uniformly cool temperature. Wide fluctuations of sand temperature increase both the task of securing precise sand tempering and the fluctuations of sand properties in the mold. Flow of sand through a sand system should be uniform, without any hangup, to prevent drying out.

The exchange paper of the foundry association of Czechoslovakia was "Contribution to the Theory of Chemically Hardened Foundry Sands by the CO_2 Process," by Leo Petrzela, Institute for Materials and Technology.

For mixtures with alkaline silicates, 0.3 per cent CO_2 theoretically is required, and practical consumption should not exceed 1 per cent. Strength after hardening and after hardening and drying depends, as does the abrasion resistance, not only on quantity and type of binder, but on the moisture content of the mixture.

Hot properties are related to the reverse reaction of sodium carbonate and hydrated silicon dioxide which takes place at 200 to 500°C. At 600°C, compressive strength sinks below 14.22 psi. Thermal expansion of chemically hardened mixtures usually does not exceed 1 per cent; from 400°C upward, shrinkage has been observed.

Castings poured in molds made of chemically hardened mixtures solidify somewhat faster than expected on the basis of temperature measurements inside the casting and from the heat transfer inside the mold. Yield does not, however, change appreciably.

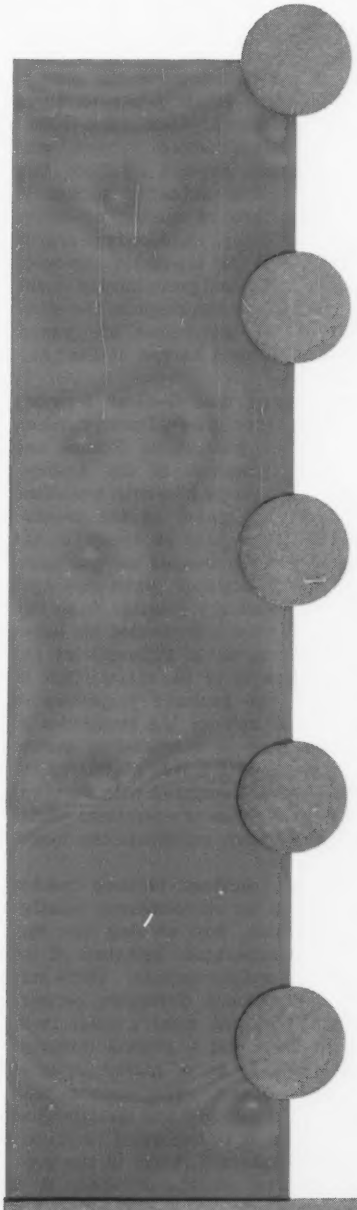
The Danish association exchange paper was by Kai Fursund, A/S Burmeister & Wain. To investigate the causes of steel penetration in foundry sand when heavy castings are poured at relatively low temperatures, a testing method was developed by which 44 cores can be tested in a single casting.

Used Four Sand Mixtures

Four different sand mixtures providing 11 uniform cores from each sand mixture in a casting were exposed to different metal pressures. Thermocouples were inserted into some cores to give an idea of the mechanism on the basis of temperature and time readings for the penetration. There is no difference in penetration of steel into cores when the casting temperature varies from 10 to 40°C above the liquidus temperature of steel. Metal penetration requires higher metal pressure as grain size of the sand decreases. When minimum penetration pressure is exceeded, penetration increases with pressure.

When the sand contains organic material, the steel dissolves carbon, and the penetration takes place at lower pressure and is deeper. Addition of up to 20 per cent quartz flour decreases minimum penetration pressure slightly, but does reduce the penetration depth. Addition of iron oxide and zircon flour does the same. In tests of two sand mixtures of identical permeability, one consisting of uniform, fine grains and the other of coarser grains with quartz flour added, the mixture of uniform, fine grains gives the least metal penetration. Addition of easily sintering inorganic compounds such as bentonite or water glass to the sand decreases minimum penetration pres-

60 CYCLE INDUCTION MELTING



A famous metallurgist once wrote: "50% of all rejects can be traced to faulty melting and pouring." When molten metal is overheated, important alloy ingredients are lost by burning. Castings or billets may be porous from combustion gases absorbed by the molten metal. Frequently, unwanted alloy ingredients are picked up from the containers used in melting. If the temperature of molten metal flowing into a mold strays from the optimum, defective castings will result. In a quiet melt alloy ingredients may not dissolve properly, and the metal cast will not meet specifications. Finally, there is the problem of nonmetallics suspended in the melt which cause occlusions and other difficulties in the end product.

60 CYCLE INDUCTION MELTING, properly applied, is probably the biggest single step that can be taken to overcome these traditional melting problems. The method is unique in its combination of two factors: Heat is generated only in the molten metal, and the entire melt is stirred by electromagnetic pressure. Furthermore, high melting rates can be concentrated in a small space. —No part of the furnace is hotter than the metal. Combustion gases are absent and controlled atmospheres can be used. The container is constructed of refractories inert to the molten metal. Temperature control of unprecedented precision is inherent in the method. Electromagnetic stirring assures complete dissolving of all ingredients and a uniform alloy. Suspended nonmetallics are deposited in the electromagnetic pressure area.

These are basic reasons why 60 CYCLE INDUCTION MELTING has had such a spectacular growth in the postwar period. Modern plants require high production rates with controlled quality, yet can assign only a minimum of skilled labor to each operation. 60 CYCLE INDUCTION MELTING minimizes hard labor in melting. It enables process control to substantially decrease the effect of human error. Cost reductions are reflected throughout each step of fabrication of a casting or billet to its end use.

60 CYCLE INDUCTION MELTING, firmly established for thirty years as the predominant production method for melting brass, has recently been applied on a much larger scale. In the last ten years, as new furnace designs became available, the method has been rapidly adopted by many progressive companies in the fields of aluminum die casting, aluminum extrusion, aluminum wire, aluminum coating, leaded copper alloy casting, zinc die casting, and galvanizing of strip in the steel mills. Well over one thousand 60 CYCLE INDUCTION MELTING furnaces are now operating in these new fields.

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sure and increases penetration depth.

The exchange paper from Verein Deutscher Giessereifachleute was "The Influence of the Clay Binder on the Green Properties of Foundry Sands," by Dr. Ing. W. Patterson, and Dipl. Ing. D. Boenisch, Rheinisch-Westfalischen Hochschule. This paper summarizes all factors which, according to present-day interpretation, influence the technological properties of molding sands.

Sand Preparation Is Basic

The relation between the swelling capacity of clays and the sensitiveness of molding sands to moisture content was discussed. Extensive investigations indicate that the influence of sand preparation often is greater than that of the silica grain or the varying quality of binders. Investigation of the green properties of molding sands shows that time of milling, initial amount of water, and size of mix appear to be vital.

F. W. Nield and David Epstein, F & M Supplies Ltd., London, contributed "Application of Sodium Silicates for Bonding Sands." The authors describe investigations carried out with four sodium silicates with SiO_2/Na_2O ratios of 2.0, 2.5, 2.9, and 3.3 used as bonding agents for a silica sand. The bond was produced by passing CO_2 through cylindrical standard test pieces, and the relationship between compression strength and gassing time was established. Cured and uncured test pieces were subjected to temperatures up to 1200°C and tested for compression strength. The following conclusions were arrived at:

1. The CO_2 process bond is due to sodium silicate which has had its viscosity increased by CO_2 gassing.

2. With the CO_2 process, only sodium silicates of low SiO_2/Na_2O ratio—about 2.0—are suitable.

3. When a grade of low-ratio sodium silicate to meet any given conditions is selected, care must be taken to select a sodium silicate with a total solids content which will not produce a gel when it is gassed.

4. Since the amount of CO_2 normally used greatly exceeds that actually required for curing, it could be reduced by dilution with air.

5. Blowing hot air through cured cores or heating them for short periods at about 100-200°C increases compression strength up to about 50 per cent. In certain instances this procedure permits a reduction in the amount of sodium silicate used.

6. An addition of water-retaining materials improves bench life of sodium silicate sand mixes.

7. CO_2 present in air does not shorten the bench life of sodium silicate sands, nor does it react with the binder in gassed cores appreciably. Changes which do take place are due to drying.

8. Breakdown of cores depends on the temperature reached in various parts of a core and on the percentage of sodium silicate in the sand.

Cores—The single paper on cores was by Richard L. Olson, Dike-O-Seal Inc., Chicago, whose subject was "Engineering Aspects of Core Box Design." The author described a special method of sealing coreboxes against blow-by. A dike-type seal is molded into the separable halves of a corebox, bonded permanently to one side, molded to the shape of the other half. When the halves are joined, the dike forms a barrier at the parting.

Metallurgy and General Foundry Practice—Prof. Albert Portevin, member of the Institut de France and honorary president of the Association Technique de Fonderie, presented the exchange paper of the association on "The Use of Gases in the Foundry." He treated the gas problem in the foundry (sand castings) and in metallurgy (ingots) from two points of view and divided his paper into two parts: 1. Influence of gas on the quality of the metal—that is, both on the intrinsic properties of the metal and on the properties of the castings as a whole. 2. Active use of gas or the role played by the atmosphere (compared with vacuum) during the series of operations which, taken together, constitute the foundry process.

In all reactions between molten metal and its surroundings, whether gas, vacuum, flux, or slag, two factors are important—agitation of the bath and contact surface. There may be an enormous difference between results obtained from a calm melting process and a process involving an emulsion in a highly agitated metallic phase. The author feels that in all foundry and metallurgical operations, it is important to control the atmosphere involved in the process and to consider whether it is worthwhile to use an inert gas such as argon.

Exchange paper from the Association Technique de Fonderie de Belgique was "Zones of Influences of Feeders," by Richard Namur, Fabrique National d'Armes de Guerre. After setting up general formulas for computing the distance over which a shrinkage head is able to feed a casting, the author shows that feeding is possible only at points where there is sufficient variation in the time of solidification. All factors influencing feeding distance depend on local cooling or heating conditions.

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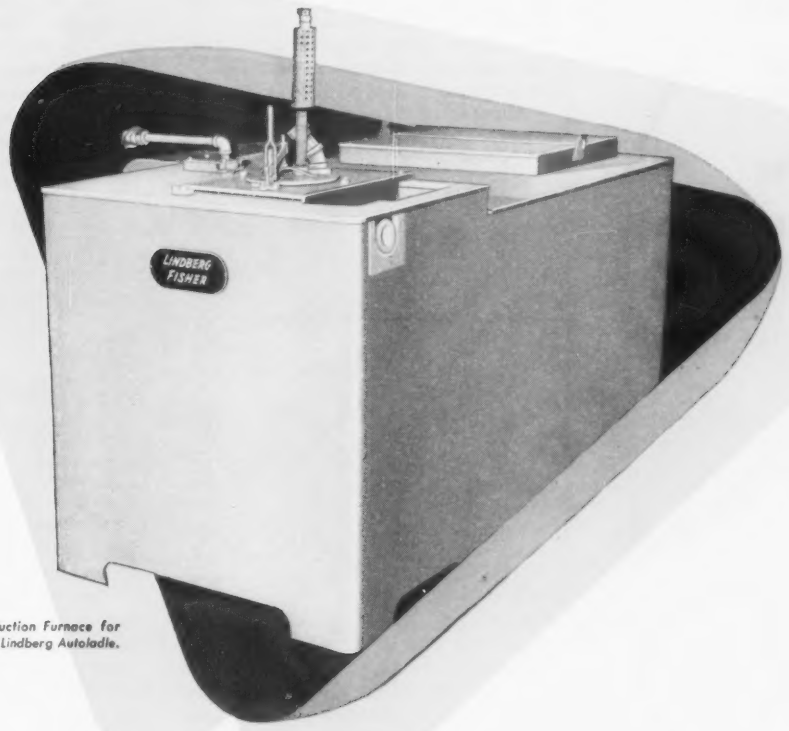

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for an efficient pouring and feeding system: 1. Feed the casting at points with greatest wall thickness. 2. Pour through feeding heads. If it is impossible to follow these two rules, pour as quickly as possible. 3. Pour as hot as is compatible with necessary metallurgical requirements. 4. Try to place several castings around the same feeding sprue. 5. If possible, allow tapering from the feeding head. 6. Use chills to create or accentuate temperature gradients.

A paper on "The Pouring Time of Sand Castings" was contributed by J. S. Abcouwer, Werkspoor N.V., Netherlands. Pouring time has to fulfill the following conditions: 1. A condition of heat loss during solidification of the metal. 2. A condition of heat load on the molding material. 3. A condition resulting from the danger of erosion. Condition 2 gives an upper limit of time and 3 a lower one, but it always is necessary to make a special study of the cores.

The pouring system must be constructed so that not only is the correct pouring time guaranteed, to prevent erosion, but also so that velocities of the metal flow do not exceed maximum values for each metal and mold. When conditions 2 and 3 are fulfilled, condition 1 gives the pouring time. From the mathematical formula of heat transfer between mold and metal published at the International Foundry Congress at Florence in 1954, a simple equation has been deduced containing two limiting conditions: 1. A condition of superheat. 2. A condition of heat loss, during the filling of the mold.

Ventilation and Working Conditions—The exchange paper from the Italian association was "Air Pollution and Dust Control in a Foundry," by Antonio Riggi, Fiat foundry department. The paper describes concisely the smoke and dust exhausting systems installed at the Fiat Foundry plant in Turin. The paper described lengthy tests carried out to determine the amount of dust and free silica in air in a foundry equipped with smoke exhausting systems.

A paper by Axel Ahlmark and Harry Ohman, National Institute of Health, Stockholm, entitled "Health Hazards in Foundries and their Prevention," surveyed common health risks associated with work in foundries.

"The Foundry Environment" by Herbert J. Weber, American Foundrymen's Society, described effects on health and efficiency of workers of new materials and processes. New problems of the industrial environment confronting foundrymen were presented. These new materials, processes, and problems include beryllium, epoxy resins, the carbon dioxide process, noise, radiant heat, and radioactive materials. The author concluded that it is financially profitable to improve the industrial environment at the same rate as the improvement in foundry technique.

"Foundry Ventilation" was the title of a paper by Karl Nilsson and Yngve Bovin, AB Svenska Flaktfabriken, Stockholm. The authors state that there are two ways of creating ventilation: Natural ventilation by thermal forces and mechanical ventilation by fans. In application, ventilation can be general, in which case the concentration of gases and dust is kept low by dilution, or it can be spot ventilation, in which gases and other impurities are caught at the point of generation. The authors reviewed applications of these methods in various sections of the foundry.

Book Review

The Casting of Steel, edited by W. C. Newell, cloth, 6 x 10 in., 599 pages, published by the Philosophical Library, 15 East 40th St., New York 16, N. Y. Price $27.50.

The editor has defined the purpose of the book "to provide steel founders and engineers with a reliable and authoritative guide upon all technical aspects of the production of steel castings."

By chapter headings the book treats properties of liquid metal; the mechanism of solidification; the melting process; use of refractories; pattern making; mold preparation and coremaking; casting into sand molds; centrifugal formation of castings; investment casting process; heat treatment and properties of steel castings; mechanical testing—physical properties—specifications; radiography, and nondestructive testing (methods other than radiography).

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Lindberg Cyclone batch type furnace for heat treating aluminum castings.

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Foundry Group Meetings

Wisconsin: Sectional meetings highlighted the initial 1957-58 meeting of the AFS chapter at Hotel Schroeder, Milwaukee. The Gray Iron Section heard Harold E. Barnum, Vanadium Corp. of America, Detroit, talk on "Inoculation of Gray Iron," with Donald S. Dalton, Belle City Iron Co., acting as chairman.

Ernest Kindt, Kindt-Collins Co., Cleveland, discussed "Personal Observations and Comments on European Foundries and Pattern Shops and Their Methods of Operation" before the Pattern Section. Albert F. Pfeiffer, Allis-Chalmers Mfg. Co., was chairman.

"Technique of Proper Handling of Electrodes," was the subject of a talk by L. A. Fisher, National Carbon Co., New York, before the Steel Section. John McBroom, Stainless Foundry & Engineering Inc., was chairman. William Ball III, Hill & Griffith Co., Chicago, spoke on "Sand for the Nonferrous Foundry" before the Nonferrous Section. Walter Puzach, Ampco Metal Inc., was chairman. The Malleable Iron Section heard Prof. Richard Heine, University of Wisconsin, discuss "Molding Fundamentals." William Haase, Lakeside Malleable Iron Co., was chairman.—*John E. Hubel.*

Washington: The AFS chapter assembled at the Engineer's Club, Seattle, on Sept. 19, and heard H. J. Weber, director of safety, hygiene and air pollution, AFS, present an interesting and instructive talk on the general problems involved in the regulation of air pollution. Herbert Heaton, Northwest regional director, AFS, from Vancouver, B. C., was a guest at the meeting.—*Frank H. Jefferson, Frank H. Jefferson Inc.*

Oregon: H. J. Weber, director of safety, hygiene and air pollution, AFS, addressed the AFS chapter at its Sept. 18 meeting. He stressed the need for foundrymen to be aware of legislation being enacted in ever-increasing numbers of states to empower communities to establish air pollution regulations.

Many communities already have adopted or are thinking of adopting the ASME Model Smoke Ordinance and applying its regulations to all types of emissions, even though the model ordinance was written for fuel burning appliances, such as powerhouse boilers. Mr. Weber pointed out this was unfair to foundries.

Referring to Oregon specifically, he said that air pollution is a local and not a state-wide problem. When Oregon enacted a state-wide law it recognized inequities and decided to evaluate pollution at ground level where the nuisance is occurring. According to the speaker, it is the only air pollution law in the country which is directed to control air pollution nuisance or damage where it is occurring. The concept is sound, but unless definite limitations on stack emissions are fixed the law is subject to capricious enforcement.—*Bill Walkins, Electric Steel Foundry Co.*

Northeastern Ohio: This AFS Chapter opened the 1957-58 season with a crowd pushing 300 on hand at the Tudor Arms Hotel, Cleveland. W. W. Maloney, AFS general manager, was a surprise guest, on his way to Norfolk, Va., to inaugurate Piedmont Chapter of AFS. Mr. Maloney announced that the AFS seminars for foundry instructors will be held in Cleveland, at Case Institute of Technology, next year, and he requested the usual fine co-operation of NEO Chapter members in the presentation of the 1958 convention and exhibit in Cleveland.

Speaker for the evening was V. A. Crosby, Climax Molybdenum Co., who discussed "Engineered Castings with Reference to Automation." His talk emphasized the relationship between castings and automation not only in reference to their production, but also to their finishing in automated machine shops. To make castings by the automated process to meet the needs of such machine shops, metallurgical and dimensional controls must be initiated to the ultimate degree. Automation imposes close restrictions on both uniformity and dimensional tolerances.—*Jack C. Miske.*

New Jersey: At its Sept. 16 meeting, the New Jersey Foundrymen's Association elected D. E. Farnar, Wm. P. Laytham & Sons Co., Paterson, N. J., as president for the coming year. E. C. Hogan, American Brake Shoe Co., New York, was elected

PITTSBURGH: Newly elected officers of the Pittsburgh AFS chapter are shown as they assembled at the start of a new meeting season recently. Seated in front, left to right, are E. P. Buchanan, Pittsburgh Coke & Chemical Co., secretary-treasurer; George J. Miklos, Westinghouse Electric Corp., president, and I. W. Sharp, American Steel Foundries, vice president. Standing in rear, left to right, are E. J. Biller, Vulcan Mold & Iron Co., director and immediate past president; W. D. Hacker, Mesta Machine Co., Stephen Davis, American Brake Shoe Co., and J. D. Wilson, Bronze Die Casting Co., all directors of the chapter. Photo through courtesy of Walter Napp, Milwaukee Chaplet & Supply Co.

vice president. William H. Mantz, Research, International Harvester castings can be sold was answered

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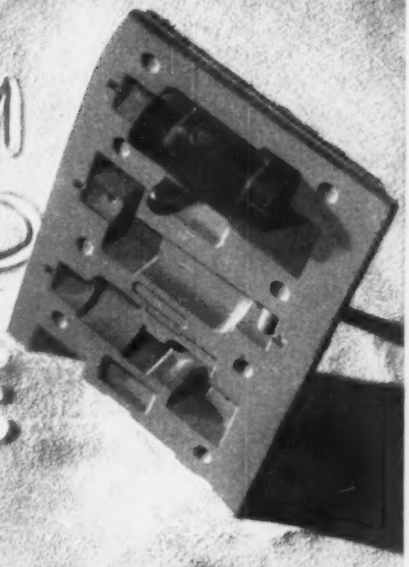

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When you produce shell molds with FOUNDREZ 7500, you reduce curing cycles. This remarkable RCI resin performs satisfactorily at extremely high oven temperatures, lets you turn out more molds per hour.

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vice president. William H. Mantz, Plainfield, N. J., and John L. Carter, Montclair, N. J., are treasurer and secretary, respectively.—*John L. Carter.*

Chicago: The AFS chapter opened its new meeting season at the Chicago Bar Association, Oct. 7, with a general meeting at which Frank G. Steinebach, editor, FOUNDRY, spoke on "Can We Sell More Castings?" Chapter President W. O. McFatridge, supervisor of foundry laboratory, Manufacturing Research, International Harvester Co., presided, and Vice President Don G. Schmidt, metallurgist, H. Kramer & Co., handled the technical program.

Following the dinner, an audio-visual presentation of the first Engineered Castings Show in Cincinnati last May was made. Titled "You Were There," and photographed by George Di Sylvestro, foundry technician, Burnside Steel Foundry Co., this was an interesting and skillful creation patterned like a travelog.

The question as to whether more castings can be sold was answered affirmatively by Mr. Steinebach. To accomplish this, however, he emphasized it will require better merchandising and more research.

In merchandising, the speaker included production, promotion and selling. Castings can be made better and cheaper by eliminating waste of materials and manpower and proper use of equipment. Promotion should be aimed at substituting castings for other forms of fabrication. Additional research is needed, Mr. Steinebach asserted. Big companies are now doing most of the current research, but he said small operators can also if they approach the subject properly and stay within reasonable limits.

The Nov. 4 meeting will feature the Robert E. Kennedy Scholarship award. Four roundtables are scheduled as follows: Gray Iron—"Altering Properties and Structure of Cast Iron by the Injection Method" by B. G. Gray, metallurgical engineer, Air Reduction Sales Co.; Malleable and Steel—"Advanced, Rapid, Metallurgical Analysis by Instrumentation, by M. F. Surls, vice president and chief metallurgist, Charles G. Kawin Co.; Maintenance—New Chicago Smoke Ordinance," by E. E. Schulze, attorney, Stevenson, Conoghan, Velde & Hackbert, and Pattern and Nonferrous—"Casting Aluminum Alloys," by Alan B. De Ross, technical specialist, Kaiser Aluminum & Chemical Sales Inc.—*Erle F. Ross.*

Cincinnati: The Cincinnati Club, Cincinnati, was the location of the AFS chapter's first meeting of the new season. Two separate technical sessions were held and 12 past chairmen of the chapter were honored for their contributions to the organization.

Edwin E. (Pop) Pollard, chief engineer, Tyler Pipe & Foundry Co., Tyler, Tex., addressed the ferrous group on the "Water Cooled Cupola at Tyler." William Romanoff, vice president and technical superintendent, H. Kramer & Co., Chicago, spoke to the nonferrous group on "Brass & Bronze Foundry Practice."—*Ernest V. Piazza, Whiting Corp.*

Pittsburgh: The first meeting of the new season for the AFS chapter was held Sept. 16 at the Webster Hall Hotel, Pittsburgh. About 100 members and guests were present to install George J. Miklos, Westinghouse Electric Corp., as president.

Frank Youngworth, Foundry & Mill Division, Blaw-Knox Co., Pittsburgh,

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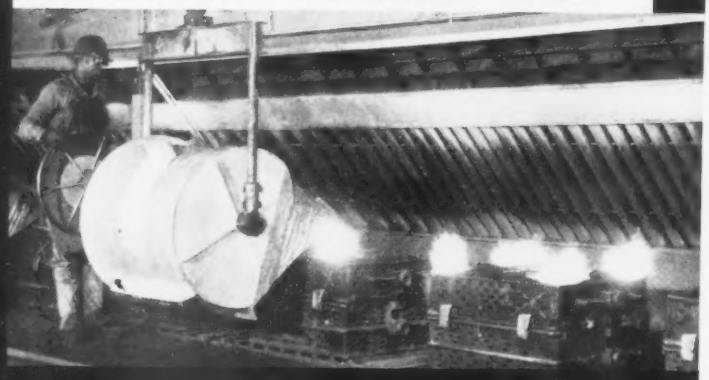

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Unground Sand	4098	4085	4060	4040	4030	4020	5040	5030	5025
Ret on 20 Mesh	2.2								
Thru 20 ret on 30	38.6	12.4	5.6	0.6	0.4	0.4			
Thru 30 ret on 40	57.6	70.8	56.2	37.2	30.2	21.2	4.0	1.2	0.6
Thru 40 ret on 50	1.4	16.3	34.8	52.0	55.8	51.4	34.8	30.4	23.8
Thru 50 ret on 70	0.2	0.5	2.8	9.0	11.4	20.6	44.4	48.2	42.0
Thru 70 ret on 100			0.6	1.0	1.8	5.2	14.4	17.0	26.4
Thru 100 ret on 140				0.2	0.4	1.0	2.0	2.0	6.2
Thru 140 ret on 200						0.2	0.4	0.4	0.8
Thru 200 ret on 270									0.2
Grain Fineness (AFS)	25.88	30.49	33.72	37.48	38.82	42.22	49.96	51.64	56.90

Unground Sand	5015	5010	5005	7030	7020	7010	C-30	C-10
Ret on 20 Mesh								
Thru 20 ret on 30								
Thru 30 ret on 40	1.2	0.4	0.2	0.2	0.2			
Thru 40 ret on 50	15.2	11.2	4.4	3.0	2.4	0.4		
Thru 50 ret on 70	40.2	35.2	31.2	26.2	18.0	8.2	0.4	0.2
Thru 70 ret on 100	35.4	37.4	41.2	42.0	45.0	46.6	28.4	8.4
Thru 100 ret on 140	6.4	10.8	15.4	16.4	20.0	23.2	44.8	50.2
Thru 140 ret on 200	1.2	4.0	5.6	9.6	11.0	15.4	18.8	28.2
Thru 200 ret on 270	0.4	0.8	1.4	1.8	2.4	4.2	5.0	8.8
Thru 270 ret on 325		0.2	0.6	0.8	1.0	2.0	2.6	4.2
Grain Fineness (AFS)	60.20	66.92	73.92	79.36	84.42	95.44	108.22	124.60

Ground Sand (Flour)	80M	100M	140M	200M	300M	325M	400M
Ret on 60 Mesh	10/20%						
Thru 60 ret on 100	25/30%	5%					
Thru 100 ret on 140	15/20%	14%	4%	1%			
Thru 140 ret on 200	10/15%	16%	6%	4%	2%	Trace	
Thru 200 mesh	25/40%						
Thru 200 ret on 270		10%	12%	6%	2%	0.5%	Trace
Thru 270 ret on 325		12%	8%	9%	11%	4.5%	2%
Thru 325 mesh		43%	70%	80%	85%	95.0%	98%

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FINE SHELL MOLDING SANDS
STANDARD CASTING SANDS — BLASTING SANDS
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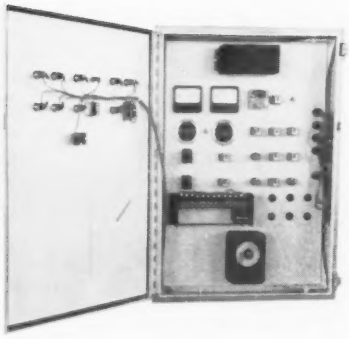

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discussed "Sand Control for Green Sand Practice in Steel Foundries." He emphasized the production aspects of quality green sand castings at minimum cost through close control of sand mixes and efficient operation of the sand system.

Proper sand selection is important to the production of quality castings. Once the sand has been selected, any changes in mixing methods, moisture content, handling techniques, and even the weather will affect the properties of the sand. A skilled sand control supervisor with a real interest in his job, bearing authority, and occupying a place of prominence in the company, is an invaluable asset to any foundry operation.—*Robert M. Love.*

San Antonio Section: Thirty members and guests of the AFS chapter attended the first meeting of the new season at Alamo Iron Works on Sept. 23. Virgil R. Lagaly, Standard Electrical Tool Co., Cincinnati, discussed "Modern Grinding Practices in Ferrous and Nonferrous Foundries." Refreshments were served by Kincaid-Osburn Electric Steel Co.—*Dennis Yell, San Antonio Machine & Supply Co.*

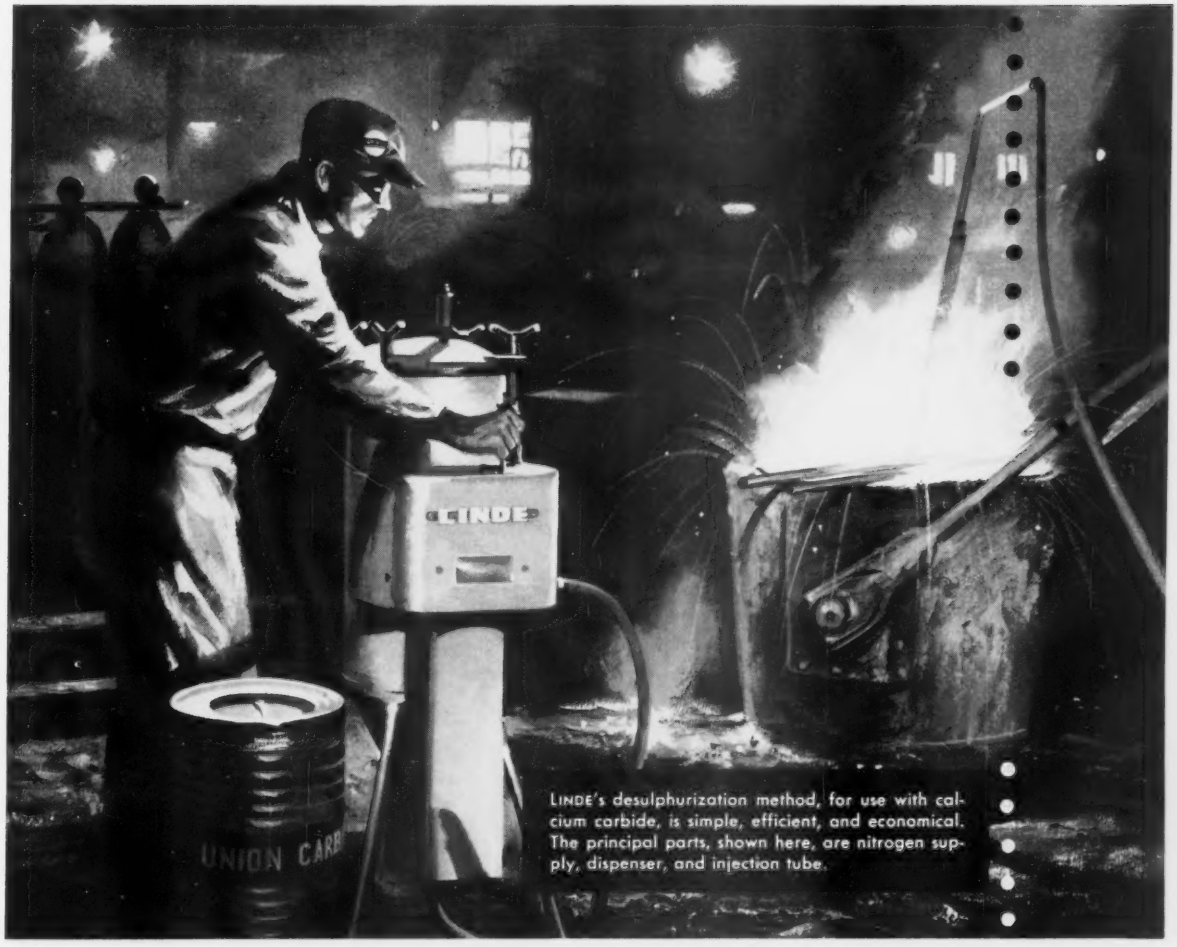
AFS Will Expand T&R Program Of Industry Courses in 1958

The AFS Training & Research Institute has announced a series of more extensive courses for 1958. In addition to repeating two of this year's courses—Industrial Engineering and Cupola Melting of Iron—the program includes Nondestructive Testing, Melting Copper-Base Alloys, Metallography of Cast Metals, Patternmaking, Industrial Environment, and Air Pollution Control and Legislation. The 1958 courses probably will be offered in the Chicago area.

Of the five courses offered in the initial 1957 series, two original courses and one repeat course still are to be held: Advanced Sand Technology, Rackham Memorial, Detroit, Nov. 4-8; Cupola Melting of Iron, University of Illinois, Navy Pier, Chicago, Dec. 2-6; and a repeat of the latter at the Sherman Hotel, Chicago, Jan. 27-31, 1958.

With the exception of the course in Sand Technology, all courses had capacity registrations. Three were oversubscribed, despite the need to repeat two to accommodate the demand for enrollment, and the size of another was enlarged from 25 to 75. All classes are limited, however, to insure personal instruction.

DESULPHURIZATION...



LINDE's desulphurization method, for use with calcium carbide, is simple, efficient, and economical. The principal parts, shown here, are nitrogen supply, dispenser, and injection tube.

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In the foundry, you can produce high grade iron only by making sure you use metal with a low sulphur content. As a desulphurizing agent, metallurgical calcium carbide assures *uniformity* in the metal you produce. You know in advance that by adding a certain amount of carbide you remove a certain percentage of sulphur. Because metal specifications can be met efficiently and economically with carbide, you eliminate any need for wasteful "trial and error" methods.

Linde's method of mixing UNION calcium carbide and molten iron is simple and sure. A stream of fine mesh carbide and nitrogen under pressure is forced from a dispenser through a hose. The graphite injection tube is immersed deep in the hot metal. The carbide blends evenly and thoroughly with the iron. Desulphurization with UNION calcium carbide creates no fumes, does not attack refractories. The LINDE equipment—nitrogen supply, dispenser, and injection tube—is easy to operate and maintain.

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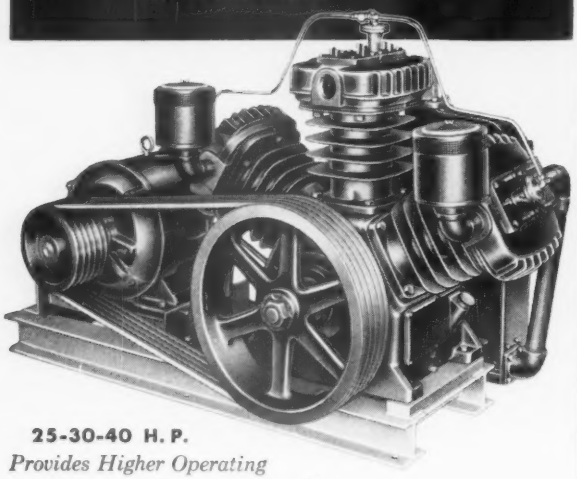

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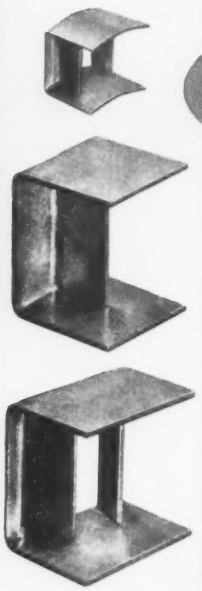

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Now you can save up to 50% on chaplet costs with Buffalo Patented Angle Stem and Double Angle Chaplets. They burn in more easily, without chilling. They are thoroughly coated to assure instant fusion with molten metal. And the unusual strength of the one-piece design permits fabrication in thinner gauges. All these features mean *savings to you.*

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on the new WATER COOLED Model M-WC
(Illustrated)

Utilizes low cost permanent molds of available steel tubing to produce gray machinable cast iron or bronze bushings. Water cooled molds can be maintained at either high or low temperature easily. High or limited production in very small space with unskilled labor. Completely safe for workmen. Simple, sturdy equipment. Quick changeover from one mold to another. Practically 100% metal yield of high quality, denser castings. Metal porosity eliminated.

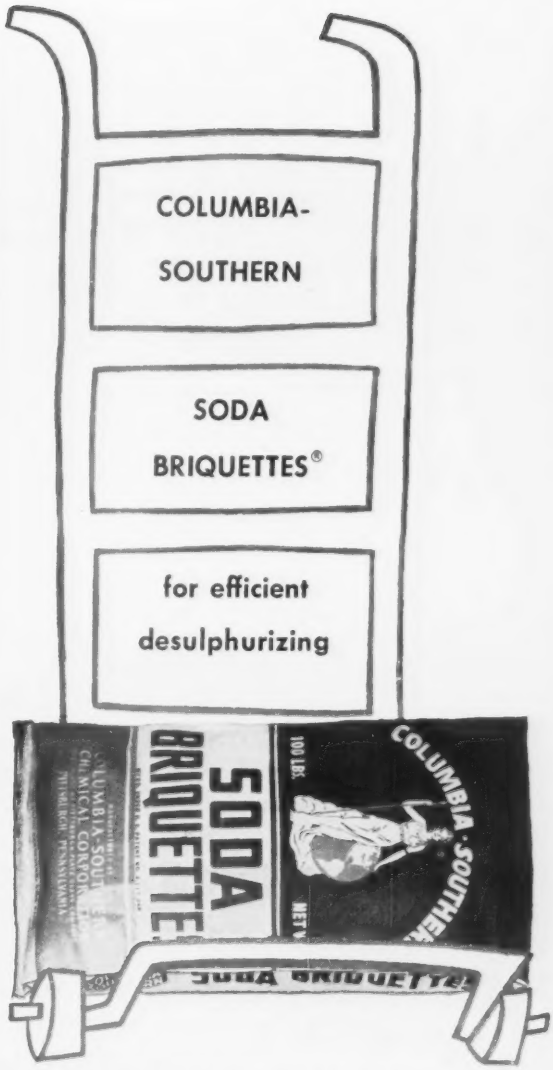
Write for New Bulletin #257 Illustrating Model M-WC

RESEARCH FACILITIES

We have available an Experimental Foundry equipped for ferrous and non-ferrous melting for both vertical and horizontal centrifugal casting production. Our facilities are available to foundries for research or trial centrifugal castings at low cost.

Centrifugal Casting Machine Co.
P. O. Box 947 **Tulsa 1, Okla.**

Circle 748 on Page 51



In Blast Furnace and Foundry, Columbia-Southern Soda Briquettes can always be relied upon for efficient action in the desulphurizing and physical cleansing of iron.

Blast Furnace operators can be certain that sulphur analysis specifications will be met for Open Hearth or Bessemer Departments.

In the Foundry, Columbia-Southern Soda Briquettes improve the melting conditions and properties of iron. When added to the melt charge, the slag becomes more fluid and refining value is increased. The release of gases and impurities is speeded for quicker surfacing of spent slag.

Order your supply today by name "Columbia-Southern Soda Briquettes." Packed in 100 lb. paper bags; easy to handle and store.

COLUMBIA-SOUTHERN CHEMICAL CORPORATION
SUBSIDIARY OF PITTSBURGH PLATE GLASS COMPANY
ONE GATEWAY CENTER · PITTSBURGH 22 · PENNSYLVANIA

DISTRICT OFFICES: Boston • Charlotte • Chicago • Cincinnati • Cleveland Dallas • Houston • Minneapolis • New Orleans • New York • Philadelphia Pittsburgh • St. Louis • San Francisco

IN CANADA: Standard Chemical Limited and its Commercial Chemicals Division

Circle 749 on Page 51

GLUTRIN
LIQUID BINDER

GOULAC
DRY BINDER

For

CORE WORK, SAND FACINGS, SPRAYS

Write for pamphlets giving detailed information. Both materials carried in stock by America's foremost foundry jobbers

Robeson Process Company
(Established 1905)

American Gum Products Co.
(Established 1915)

GENERAL OFFICES AND PLANT: • ERIE, PA.

Circle 750 on Page 51

Master Power
HARD CHROMED • PORTABLE PNEUMATIC TOOLS

DO MORE WORK AT LESS COST
because they deliver more power per cubic foot of air consumed, are light in weight for easier maneuverability and they retain their new tool power longer.

ARE PREFERRED BY OPERATORS
because they are lighter in weight, better balanced and designed to reduce shock and be free from vibration.

IF YOUR PROBLEM INCLUDES
chipping, ramming, grinding, buffing, sanding or wire brushing, *write us today for full particulars.*

THE MASTER PNEUMATIC TOOL COMPANY, INC.
ORWELL, OHIO • U. S. A.
SALES • SERVICE • STOCK • COAST TO COAST

WHAT DO YOU NEED IN A COST METHOD

The simplest and most complete method of costing ever prepared for nonferrous foundries is found in

BASIC COST PRINCIPLES FOR NON-FERROUS FOUNDRIES

(Non-Ferrous Founders' Society Publication)

Up-to-the-minute guide for costing in both small and large foundries. Prepared by practical foundrymen, based on 10 years of research and experience of the industry under Government Pricing Regulations.

Price $5.00 Postpaid

THE PENTON PUBLISHING COMPANY
Book Department
1213 West 3rd St. Cleveland 13, Ohio

Circle 751 on Page 51

"Put it where you want it, while you watch it!"

with this Push-Button, Floor Controlled

EUCLID CRANE

AT WORK IN A LARGE AUTOMOTIVE FOUNDRY

Foundry cranes fall into a class by themselves as we see it.

Abrasive and corrosive atmospheric conditions that prevail in foundries make dirt and dust proof mechanisms imperative. Precision load control with trouble-free operations for long periods of service are requisite.

These and many other valued features are common to Euclid Foundry Cranes.

Push-button and rope pendent floor controls as well as overhead cab operation is available.

Euclid Cranes carry their share of the production load every day in foundries all over the world.

We can build any foundry crane you require.

A phone call or letter will put our services at your disposal.

Write for our Catalog on Cranes and Hoists.

EUCLID

RAISE PROFITS

EUCLID HOISTS
for Dependable Service
2000 to 40,000 lbs. Capacities

THE EUCLID CRANE & HOIST COMPANY

1360 CHARDON ROAD
CLEVELAND 17, OHIO

Circle 752 on Page 51

chemicals for the foundry industry

ZIRCON SAND

ZIRCON FLOUR

SILICA

POTASSIUM TITANIUM FLUORIDE

POTASSIUM ZIRCONIUM FLUORIDE

Berkshire Chemicals

INC.

420 LEXINGTON AVENUE, NEW YORK 17, N. Y.

BOSTON • CHICAGO • CLEVELAND • PHILADELPHIA • SAN FRANCISCO

Circle 753 on Page 51

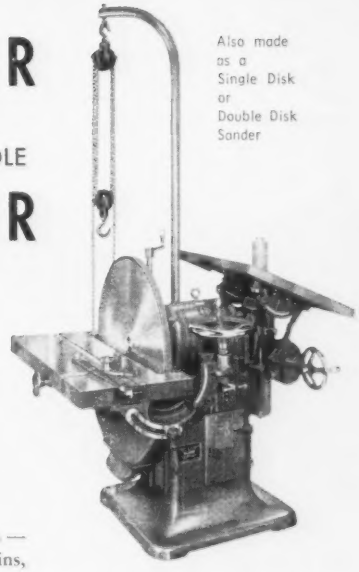
OLIVER

30-INCH

DISK AND SPINDLE

SANDER

for pattern shops



Also made as a Single Disk or Double Disk Sander

Swiftly sands patterns — knots, cross or end grains, screws, nails, etc. Both tables tilt 45°. Disk table adjustable vertically. Takes spindles 2", 3", 4" in diameter, and 9" long. Has accurate duplicating and circle sanding attachments. Helps patternmakers do better work in less time. Write for Bulletin 34.

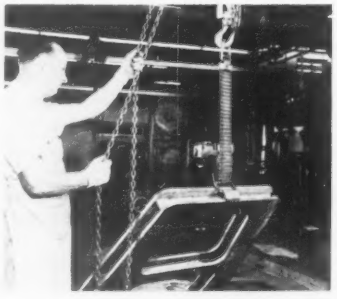
Oliver makes an extensive line of woodworking machines for pattern shops including Pattern Lathes and Pattern Millers. Get all the facts.

OLIVER MACHINERY COMPANY
Grand Rapids 2, Michigan

Circle 754 on Page 51

The Shakeout

Woven Wire Slings Eliminate Damage



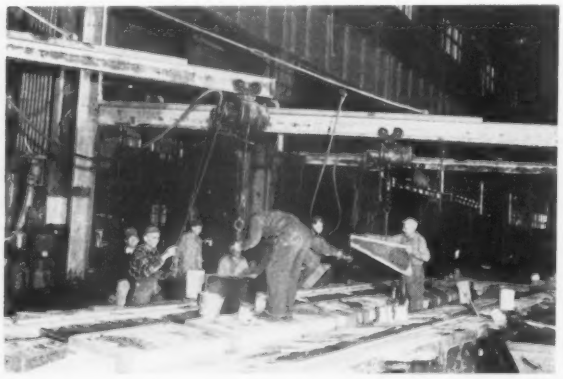
WOVEN WIRE SLINGS have proved their durability in handling dies and jigs without damage at Grumman Aircraft Engineering Corp., Bethpage, Long Island, N. Y. In the repair or manufacture of dies and jigs, top and bottom parallel surfaces must be machined, requiring that the parts be turned over. Woven wire slings do this job without damage to themselves or to the dies or jigs.

Because of their construction, the woven wire slings flex across their entire width, so that they wrap snugly and tightly around the load. Use of these slings also has made this operation a one-man job, hereas two men formerly were required. The operator slips the woven wire sling under the die, passes the male handle through the female handle, and attaches the male handle to the lift hook. The slings are manufactured by the Cambridge Wire Cloth Co., Cambridge, Md.

For More Details Circle No. 487—Page 204

100 Air Hoists Do Demanding Foundry Jobs

MORE THAN 100 air-powered hoists are used in the Commonwealth plant of General Steel Castings Corp., Granite City, Ill., to permit close control in handling sand cores and in many other operations. Use of these Ingersoll-Rand air hoists, ranging in capacity from 1000 to 10,000 lb, is reported to have sped production, promoted product quality, and reduced maintenance costs.



The air hoists have unlimited speed range since control is effected by throttling the flow of compressed air. It thereby is possible to lower a load a fraction of an inch, a control feature of great value in positioning cores in molds or in easing a corebox off a completed mold. Because an air motor can stall under overload without burning out or suffering damage of any other kind, downtime and maintenance are reduced or eliminated.

For More Details Circle No. 488—Page 204

Load Control System Cuts Power Costs

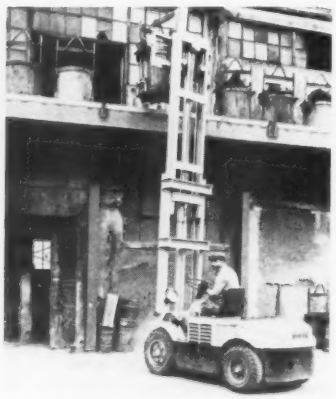
INSTALLATION of an automatic load control system on its electric furnaces currently is saving Allegheny Ludlum Steel Corp. an estimated $30,000 per month.

For electric melting furnaces, Allegheny bought electrical power that peaked to well over 100 megawatts if unregulated. Its total power bill consisted of a 15-minute demand charge (about $1.80 per kva per month) and an energy charge of about $0.004 per kwhr. Analysis of the company's load control curve by a Leeds & Northrup field engineer showed that substantial savings should result if demand was reduced and that this reduction could be accomplished without a decrease in steel production.

A load control system was installed to regulate the 15-minute demand, rather than the instantaneous kilowatt, as in a normal control application, and the control now regulates demand at about 70,000 kw. L & N engineers estimate that the equipment has paid for itself within six months.

For More Details Circle No. 489—Page 204

Lift Trucks Facilitate Cupola Charging



BECAUSE OF YARD RESTRICTIONS, Washington Iron Works, Seattle, Wash., has developed a unique and economical cupola charging system which involves use of a Hyster 6000-lb lift truck equipped with a boom attachment.

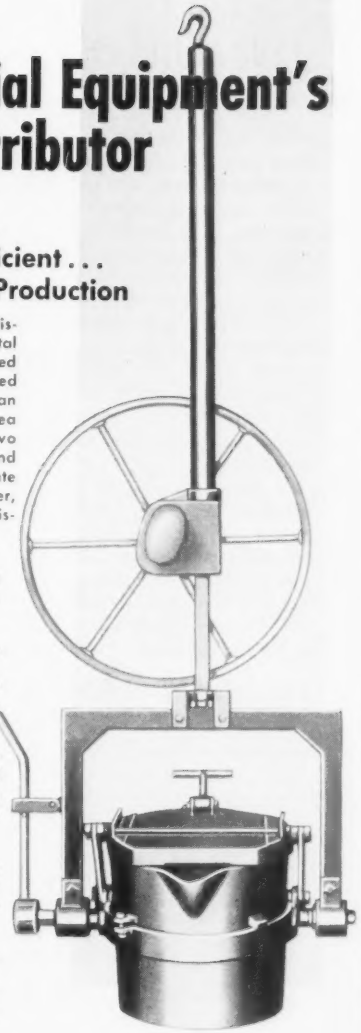
Drop-bottom charging buckets for coke and metal charges are loaded, weighed, numbered, and lifted to an outside overhanging platform at charging level. The buckets are weighed by a scale mounted to the uprights. A second truck on the overhanging platform carries the buckets to the cupola for charging.

For More Details Circle No. 490—Page 204

Industrial Equipment's Distributor

Faster...
...More Efficient...
...Safer Production

Industrial Equipment's distributor for molten metal makes possible increased production without increased cost. It enables one man to pour a large floor area as fast or faster than two or more men using hand ladle pouring. Investigate the advantages of this safer, stronger, more efficient distributor.



- One hand control with low pull required to raise maximum load.
- Exceptional pouring ease
- Efficient load brake holds load at any desired position
- Entire rigid assembly swivels at top hook, and bail connection can be set at any position required
- Design combines maximum strength and low weight with large safety factor
- Minimum moving parts
- All parts enclosed in a compact housing — no wasted space
- All bearings anti-friction type sealed from dirt

Industrial Ladles Pour More Metal Per Day— Easier...Safer...With Less Man Power

Industrial Equipment Co. manufactures a complete line of standard ladles to provide faster, more accurate pouring in every type of foundry. Heat distortion and binding are eliminated, even if ladles are used all day without a chance to cool between pours. In addition to its standard ladles, Industrial also develops custom ladles for special applications.

WRITE TODAY FOR OUR COMPLETE CATALOG

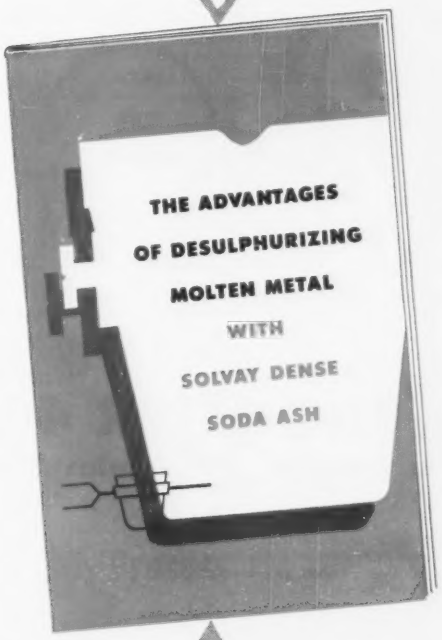
Manufacturers of Constantly Improved Foundry Equipment Since 1900

Ladles Bowls Shanks Bails Tongs

Industrial EQUIPMENT COMPANY
115 OHIO ST., MINSTER, OHIO

Circle 755 on Page 51

Full facts on Desulphurizing at *lowest* cost!



Tells how to apply —equipment to use!

SOLVAY DENSE SODA ASH costs less . . . melts rapidly . . . disperses uniformly. Free-flowing. Requires simple equipment.

SOLVAY®

Allied Chemical

SOLVAY PROCESS DIVISION
ALLIED CHEMICAL & DYE CORPORATION
61 Broadway, New York 6, N. Y.

Please send me without cost your booklet—"The Advantages of Desulphurizing Molten Metal with Solvay Dense Soda Ash."

Name_____

Position_____

Company_____

Address_____

City_____ Zone____ State_____ AT-11

Circle 756 on Page 51

GIVE YOUR CUSTOMERS ALUMINUM CASTINGS that IMPROVE WITH AGE

Frontier 40-E Aluminum Alloy			
Time Aged	Yield Strength	Tensile Strength	Elongation
21 Days	25,440	34,400	5.1
2 Years	31,300	39,300	4.5
2½ Years	30,650	39,050	4.5
3 Years	29,400	37,900	4.0
4½ Years	30,075	38,000	3.75
8 Years	31,550	37,025	5.5

The above figures were derived from 12 sample casts made over a period of 8 years. Figures shown are the average of all the samples in each group.

USE FRONTIER 40-E
The Original Aluminum Alloy

Truck frame cross members like the one illustrated of Frontier 40-E Aluminum Alloy replaced steel members and increased pay load 2400 pounds.

Castings made of FRONTIER 40-E actually grow stronger while in use. FRONTIER 40-E is the original Aluminum Alloy containing zinc with magnesium, titanium and chromium. It is backed by twenty-five years of Frontier formulating and metallurgical "know how." 40-E Aluminum Alloy has established a reputation for high strength without heat treating.

Why take chances with alloys that claim to be just as good. Imitations that are too new to have proven their reliability.

Frontier 40-E Aluminum Alloy will keep your customers happy ... and happy customers are the only kind you keep!

Every FRONTIER 40-E ALUMINUM Casting will have These Extra Benefits

- **Shock Resistance** to withstand explosive and standard impact shock.
- **Corrosion Resistance.** Excellent even under stress.
- **High Yield Strength.** Important where distortion or misalignment of parts would make the assembly inoperative.
- **Machinability.** Free machining without tearing of metal.
- **Pressure Tightness.** Fine grain withstands high pressures.

FRONTIER BRONZE CORP.

4878 PACKARD ROAD, NIAGARA FALLS, NEW YORK

Exclusive Foreign Producers of 40-E
DARALUM CASTINGS LTD., DARLINGTON, ENGLAND
PAUL BERGSOE & SON, GLOSTRUP, DENMARK
L'ALUMINUM FRANCAIS, PARIS, FRANCE

Circle 757 on Page 51

Inducto "Push-Out" Furnaces save minutes on every melt

Inducto "Push-Out" furnaces with removable crucibles save valuable minutes in transfer time on every melt . . . meaning extra melts per day . . . thousands of extra castings each year. The moment the charge in one crucible is ready for pouring, the power is immediately transferred to the waiting charge in the other crucible. The crucible of molten metal is raised from the furnace hydraulically so it can easily be transported to the molds.

Inducto "Push-Out" furnaces are short and compact, occupying minimum floor space. The operator's controls are mounted on the furnaces for convenience and accessibility. When teamed with Inducto Precision Control, these furnaces offer the ultimate in production melting.

More detailed information may be obtained by writing for Bulletin 70. Write today.

INDUCTOTHERM CORP.

412 Illinois Ave. • Delanco, N. J.

Circle 758 on Page 51

FOUNDRY

EDWIN S. CARMAN, INC.

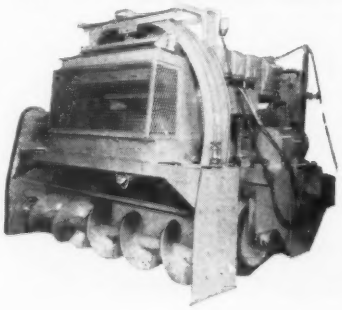
LEE ROAD AT MAYFIELD
CLEVELAND 18, OHIO

A COMPLETE FOUNDRY SERVICE

MECHANIZATION

Circle 759 on Page 51

UP TO A TON A MINUTE AT LOWEST COST!
with the RINGLIFT SAND CONDITIONER



Revolutionary new principle. Mixes, adds water, lifts all sand from floor, screens, magnetically separates, aerates. Cools hot sand. Cuts swath to 104", turns in 63" radius. Straddles 24" high x 70" windrows. Most economical machine of its type to buy, operate and maintain. Send for folder.

STATES ENGINEERING CORPORATION
920 W. Berry St.
Fort Wayne, Indiana

Circle 760 on Page 51

KEEP WORK AREAS WARM
. . . improve worker efficiency!

Low cost all-purpose heater for shops, foundries and semi-open areas

HY-LO Portable Heaters are the answer for permanent or temporary heat. Ideal for hard-to-heat areas—temporary heat in emergencies—any standby or supplementary heating!

WHY HY-LO IS BEST

- Low 1st cost low operating cost.
- 70,000 to 140,000 BTU per hour!
- Burns only ½ to 1 gal. per hr. of low cost fuel oil.
- One filling lasts 10 to 20 hours.
- Exclusive damper for quick extinguishing.
- Carrying handles for easy moving.

Nationally accepted! Produces more heat per dollar invested than any other heater! Write or wire for nearest dealer.

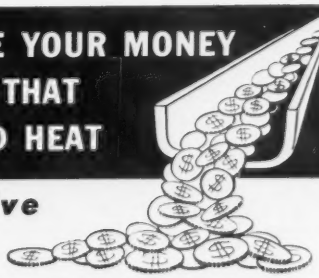
DISTRIBUTORS IN ALL PRINCIPAL CITIES

Easily Portable . . HOT & CLEAN!

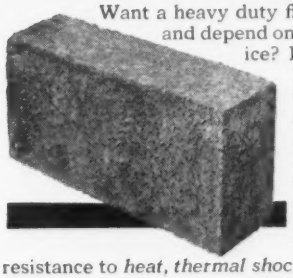
Schau PRODUCTS CO.
275 Stowell St., Upland, Calif.

Circle 761 on Page 51

DON'T WASTE YOUR MONEY ON A FLOOR THAT WON'T STAND HEAT



Till You've Read This!



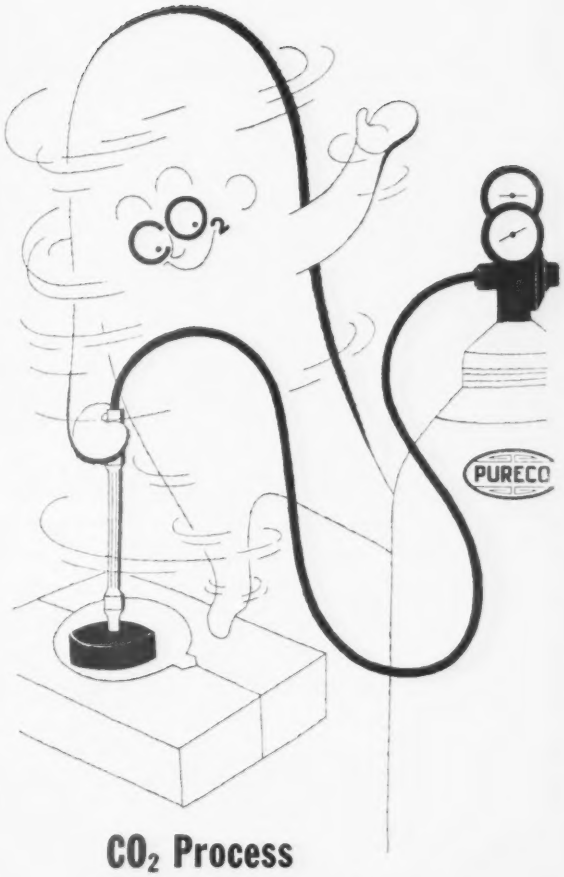
Want a heavy duty floor you can lay down *fast* . . . and depend on for *years* of trouble-free service? Investigate EMERI-BRICK*. Made of the same pure CORTLAND EMERY AGGREGATE and Calcium Aluminate Cement as famous *heat resistant* EMERI-CRETE FLOORING, in a convenient precast, precured form, EMERI-BRICK provides a floor with incredible resistance to *heat, thermal shock* and *heavy wear.* That's why leading foundries and steel mills swear by it. Get the facts—write for free information today. Complete specifications provided for every installation.

Write for FREE Bulletin HR-2.

EMERI-BRICK

WALTER MAGUIRE COMPANY, INC.
Originators of emery aggregate flooring
60 East 42nd St. • New York 17, N. Y. * TM
Producers of
EMERI-CRETE FLOORING* • EMERI-TOPCRETE* • EMERI-BOND*

Circle 762 on Page 51



CO_2 Process cures molds and cores in seconds—without baking—
Equipment Cost: Less than $100!

Pureco can tailor a CO_2 installation to meet your specific foundry requirements—whether they be large or small.

Call your nearest Pureco office for information regarding a complete line of CO_2 equipment and CO_2 supply systems—cylinders, cylinder banks, converters, receivers—all described in Bulletin #27. Write for your copy.

Remember—Pureco Technical Sales Service is anxious to serve you.

PURECO CO_2

Pure Carbonic Company

A Division of Air Reduction Company, Incorporated
150 EAST 42nd STREET, NEW YORK 17, N. Y.

AT THE FRONTIERS OF PROGRESS YOU'LL FIND AN AIR REDUCTION PRODUCT

Circle 763 on Page 51

this is the DYNAMIC FOUNDRY INDUSTRY...

Value of foundry industry production is at an all time high of over $6½ billion, as shown in the table below. Because of its end-product system of classifying plants, the U.S. government includes in its foundry SIC groups only the "jobbing" foundries—the 3,650 plants which produce castings for resale. However, the dynamic foundry industry is bigger than SIC figures indicate. It also embraces the 2,000 "captive" foundries operated by companies that make castings for their own use. The annual buying power of *all* castings producers, both jobbing and captive foundries, exceeds 2½ billion dollars for equipment, materials and supplies. Industry figures presented here are based on the 1954 Census of Manufacturers, and estimates by Sales Management and FOUNDRY's market research department.

SIC Code	Industry Title	Value Of Products Shipped		Employment	
		1954	1956	1954	1956
3321	Gray iron foundries (jobbing)	$1,419,000,000	$1,810,000,000	133,900	150,000
	Gray iron foundries (captive)	1,167,000,000	1,339,000,000	74,400	80,400
	Total-Gray Iron foundries	**2,586,000,000**	**3,149,000,000**	**208,300**	**230,400**
3322	Malleable foundries (jobbing)	212,000,000	265,000,000	23,400	27,100
	Malleable foundries (captive)	169,000,000	187,000,000	12,200	13,100
	Total-Malleable foundries	**381,000,000**	**452,000,000**	**35,600**	**40,200**
3323	Steel foundries (jobbing)	535,000,000	925,000,000	55,100	70,000
	Steel foundries (captive)	186,000,000	257,000,000	15,300	21,000
	Total-Steel foundries	**721,000,000**	**1,182,000,000**	**70,400**	**91,000**
3361	Nonferrous foundries (jobbing)	874,000,000	1,127,000,000	73,500	83,800
	Nonferrous foundries (captive)	560,000,000	681,000,000	39,600	47,400
	Total-Nonferrous foundries	**1,434,000,000**	**1,808,000,000**	**113,100**	**131,200**
FOUNDRY INDUSTRY TOTAL		$5,122,000,000	$6,591,000,000	427,400	492,800

How FOUNDRY can help you get more business from the rich, growing metal-casting market

1 Help on ANALYZING THE MARKET

Tells you where *every* foundry in the U. S. and Canada is located . . . describes each one in detail. Revised every two years, Penton's Foundry List keeps you up-to-date on *changes* that take place . . . helps you know who and where to sell. Available at moderate cost.

2 Help on EVALUATING PERFORMANCE AND POTENTIALS

A "Foundry Industry MARKETING GUIDE" identifies the 96 primary trading areas ranked by productive capacity. Permits a quick, accurate check of your sales performance and potentials by territories . . . pinpoints market potentials.

3 Help on SETTING UP A SALES CONTROL PLAN

Sales Control Cards tailor-made to your sales and territory requirements give your salesmen "blue ribbon" prospect lists. Essential information is coded on punch cards for your use in direct mail, sales analysis, personal selling. Available at moderate cost.

4 Help on MAKING YOUR DISTRIBUTION MORE EFFECTIVE

A system for improving or starting an effective distribution setup to cover the foundry industry. This list of supply houses and agents gives locations and necessary information . . . classified advertising in FOUNDRY often backs up this service.

5 Help on PROMOTION AND MERCHANDISING PROGRAMS

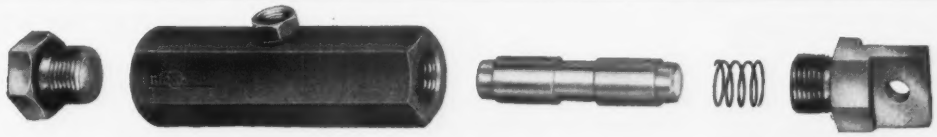
Advertising in FOUNDRY is backed, on request, by a complete merchandising program including ad and editorial reprints, a regular newsletter "CONTACT", even personal letters to kick off a campaign. It is aimed at your customers and prospects as well as your own salesmen and distributors, should you wish to use this service.

. . . and you do more business with foundries when you advertise in . . .

FOUNDRY

NBP BPA

a PENTON *Publication / Penton Building • Cleveland 13, Ohio*



3 steel alloys*

Give Branford vibrators longer life

Strength and durability are built in . . . preserved . . . through specific steel alloys that give each part of each Branford Vibrator the properties it needs for a long serviceable life.

Branford Pistons are built from hard, chrome-coated steel, especially wear resistant to maintain efficient precision over long periods of use.

Springs made from high tensile, flexible steel flex themselves millions of times without fracture . . . without fatigue.

Branford body steel is rugged, tough, ready to take the torture and stress of vibration without breaks, cracks, and without frictional wear.

When you specify "Branford Vibrators" you receive unmatched performance, longer service, less down time.

Write for your Branford catalog and the name of your local Branford distributor.

*** Branford Vibrators are built in every size—and in every size they are built from steel throughout (including the bodies).**

THE BRANFORD COMPANY 130 CHESTNUT STREET — NEW HAVEN, CONNECTICUT

Circle 764 on Page 51

HIGH SILICA QUARTZITE PEBBLES

★ ★ ★

R. W. SIDLEY, INC.

THOMPSON, OHIO TEL. 2701

Circle 765 on Page 51

Did you know that ? ? ? ?

. . . . . the handy Reader Service Cards in each issue of FOUNDRY will enable you to ask for tearsheets of editorial articles? See page 51.

CHARCOAL

HARDWOOD LUMP

also

WILLOW

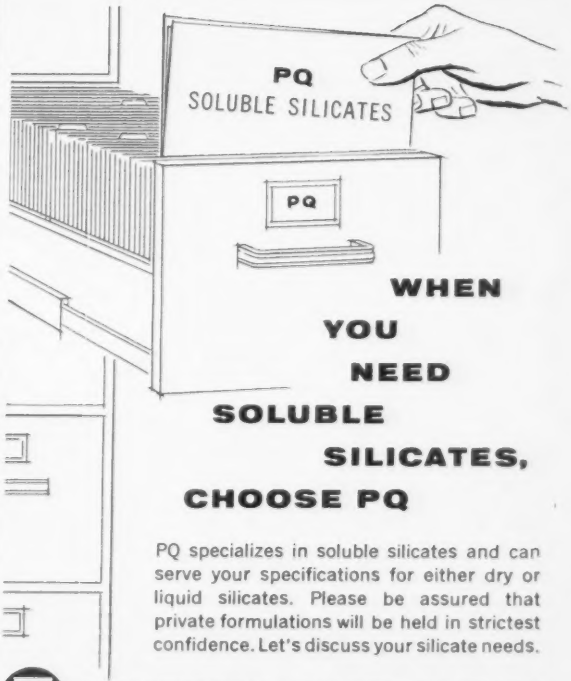
ON SPECIAL ORDERS

McDONALD CHARCOAL CO.

DWIGHT BLDG. KANSAS CITY 5, MO.

One of the oldest producers in the Midwest

Circle 767 on Page 51



WHEN YOU NEED SOLUBLE SILICATES, CHOOSE PQ

PQ specializes in soluble silicates and can serve your specifications for either dry or liquid silicates. Please be assured that private formulations will be held in strictest confidence. Let's discuss your silicate needs.

PHILADELPHIA QUARTZ COMPANY
1062 Public Ledger Building, Philadelphia 6, Pa.
DISTRIBUTORS IN OVER 65 CITIES TRADEMARK REG. U. S. PAT. OFF.

PQ SOLUBLE SILICATES

PQ WORKS: ANDERSON, IND.; BALTIMORE, MD.; BUFFALO, N.Y.; JEFFERSONVILLE, IND.; CHESTER, PA.; KANSAS CITY, KANSAS; RAHWAY, N.J.; ST. LOUIS, MO.; UTICA, ILL.

Circle 768 on Page 51

CLASSIFIED ADVERTISING

Help Wanted

WANTED

FIELD SERVICE AND SALES REPRESENTATIVE

With technical sand control or metallurgical experience.
A well established manufacturing and supply company has an opening for an aggressive man who likes sales work, and who can adjust to being away from home an average of ten nights per month.
Southern territory, salary, car and expenses furnished, plus profit-sharing, bonus and retirement plan. Basic salary open in keeping with experience and ability. Our own men know of this offer.
Write giving full details of education, foundry experience and personal data.

BOX 754, FOUNDRY

PENTON BLDG. CLEVELAND 13, OHIO

FOUNDRY SUPERINTENDENT

Well established and rapidly growing Pennsylvania Foundry producing wide range of medium and heavy gray iron castings to top quality specifications requires man of proven ability and experience in all practical phases of gray iron molding, coremaking and melting.

Technical education desirable but secondary to necessary practical background. Outstanding position for man presently employed in similar capacity who seeks faster promotion and financial opportunity. Starting salary well above established average. Age range from 35 to 50. In reply give complete history past employment with three references. All negotiations in strict confidence.

BOX 791, FOUNDRY

PENTON BLDG. CLEVELAND 13, OHIO

SALES ENGINEER

Staff position for sales development with large metal producer. Man to work with metal distributors, foundries and consumers of castings. Experience in foundry sales, production, or related metal industry would be desirable. B. S. in Engineering or Business Administration minimum. Headquarters New York City. Age to 35. Send complete resume and minimum salary requirements.

BOX 729, FOUNDRY

PENTON BLDG. CLEVELAND 13, OHIO

PERSONAL DIRECTOR
Foundry Northern Ohio

Fully qualified to assume top level management and labor relations—Approximately 300 employees. Must have proven record. Challenging opportunity. Send resume outlining personal record, previous work record, education background and salary requirement.

BOX 749, FOUNDRY

PENTON BLDG. CLEVELAND 13, OHIO

CLEANING ROOM SUPERINTENDENT

Must have supervisory experience and be completely familiar with all phases of cleaning room operation for a miscellaneous steel jobbing foundry producting castings up to 10,000 pounds. Excellent opportunity for an aggressive qualified man with a modern and progressive foundry located in the Middle West producing 600-700 tons per month. Advise full particulars including salary requirements. Address: Box 768, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

METALLURGICAL ENGINEER

Nationally known Central Illinois Malleable Iron Foundry; 650-750 employees, has an immediate opening for a young graduate Metallurgical Engineer. Applicants should state age, education and experience, if any, in first letter. Address: Box 757, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

WANTED

Night shakeout foreman for mechanized gray iron jobbing foundry. Ounces to 12 ton capacity. Good job for right man. Address: Box 753 FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

FOUNDRY ENGINEER
FOR
BRASS FOUNDRY

National manufacturing concern with plant in Greater Boston area has vacancy for man with broad training in nonferrous metallurgy and with 5 years' experience in nonferrous foundry operations.
Must be capable of handling all technical operations in connection with foundry problems.
This is a challenging opportunity with respect to shell molding and other modern foundry processes.
Write fully giving details of education background, experience and salary requirements to:

BOX 778, FOUNDRY

PENTON BLDG. CLEVELAND 13, OHIO

FOUNDRY SUPERVISOR

Experienced, to direct high production mechanized iron molding operations in St. Louis. Excellent future.

BOX 761, FOUNDRY

PENTON BLDG. CLEVELAND 13, OHIO

FOREMAN-NONFERROUS

To take charge of a modern foundry producing ornamental, architectural and tablet castings in bronze and aluminum. Able to work along with and direct molders. Good opportunity for right party. State age, experience and salary desired in confidence. Address: Box 758, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

FOUNDRY FOREMAN
SUPERINTENDENT

Eastern soil pipe and fitting foundry has an opening for an experienced supervisor able to produce high quality gray iron castings. Must be mechanical and a good manager. Age limit 35 to 55. Address: Box 727, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

WANTED

Foundryman with wide experience and knowledge of gray iron metallurgy and prepared to travel from headquarters in Chicago area. Address: Box 714, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

WANTED

Assist owner with operating small expanding aluminum permanent mold foundry in Los Angeles area. Give full details including education, experience and earnings. Under 50. Excellent opportunity for right man. Address: Box 771, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

SALES MANAGER

Excellent opportunity for experienced Sales Manager with established contacts to handle sales of malleable and pearlitic castings for modern mechanized foundry located in midwest. Our employees know of this ad. Address: Box 780, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

FOUNDRY RESEARCH
SUPERVISOR

Internationally known research organization has excellent opportunity for an experienced metallurgist to administer the activities of its Foundry Research Section. This individual will direct diversified technical programs as well as maintain close customer contact.

He should have a minimum of a B.S. degree and ten years of diversified research and practical experience. This is a permanent position with an expanding organization offering unusual opportunity for personal and professional development.

Located in Midwestern metropolitan area, we offer a generous relocation allowance along with outstanding vacation, insurance and retirement benefits.

Please send complete resume. All replies will be treated as confidential.

BOX 750, FOUNDRY

PENTON BLDG. CLEVELAND 13, OHIO

FOR SALES DEPARTMENT

A large Middle West foundry, manufacturer of malleable and steel castings, requires the services of a man for its sales department. Applicant must have technical knowledge of foundry casting problems and actual experience selling ferrous castings in the Middle West. All replies will be kept confidential. Please send a complete resume including salary desired. Our sales organization is aware of this ad.

BOX 767, FOUNDRY

PENTON BLDG. CLEVELAND 13, OHIO

FOREMAN

For modern gray iron foundry in Texas. Good future for right man. In reply please give experience, age and salary range. Replies confidential. Address: Box 723, FOUNDRY, Penton Bldg., Cleveland 13, Ohio

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HELP WANTED

Mechanical Engineer—with foundry background for production supervision in HEAVY CENTRIFUGAL FOUNDRY, NONFERROUS. Address: Box 746, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

MOLDING FOREMAN

Gray iron, 15-20 squeezer molders, located in pleasant small town in central state. Prefer man with some technical training on sand and cupola control. Address: Box 755, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

Positions Wanted

FOUNDRY FOREMAN OR
ASSISTANT SUPERINTENDENT

Age 44. Thorough knowledge of all phases of gray iron foundry operations including cupola; 22 years' gray iron foundry experience. 12 years' foundry supervision. References furnished. Address: Box 732, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

FOUNDRY MANAGER OR SUPERINTENDENT

Age 45, practical experience, ferrous, nonferrous metals. Now producing large castings with latest and most efficient methods, including CO_2. Excellent administrative ability. Good labor relations. Address: Box 759, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

SUPERINTENDENT

Of Cleaning and Finishing—Steel Foundry. Fifteen years' experience. Large Open Hearth or Electric Castings. Will relocate. Address: Box 770, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

CLASSIFIED ADVERTISING

Employment Service

FOUNDRY PERSONNEL SPECIALISTS
National Placement and Procurement of
GENERAL AND PLANT MANAGERS, PLANT SUPERINTENDENTS, FOREMEN—ALL DEPARTMENTS, METALLURGISTS, ENGINEERS, CONTROLLERS, ACCOUNTANTS, SALESMEN, SALES MANAGERS, PERSONNEL DIRECTORS, PURCHASING AGENTS
Confidential Inquiries Invited
From Employers and Qualified Applicants
For Fast Competent Assistance Contact
DRAKE PERSONNEL, INC. **HARRISON 7-8600**
JOHN COPE, DIRECTOR **220 SOUTH STATE ST., CHICAGO, ILL.**

SALARIED PERSONNEL
$5000-$30,000. This reliable service established 1927, conducts confidential negotiations for high grade men who seek a change of connection under conditions assuring if employed full protection to present position. Send name and address only for details. Personal consultation invited. Address: JIRA THAYER JENNINGS, P.O. BOX 674, MANCHESTER, VERMONT.

Positions Wanted

SUPERINTENDENT OF FOUNDRY
Successfully managing internationally known captive gray iron foundry of 250 ton capacity. Graduate Metallurgical Engineer, age 48, 22 years' experience at operating and management levels. For personal reasons would consider responsible position requiring thorough practical background all phases foundry operations. Address: Box 760, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

FOUNDRY SUPERINTENDENT
Gray iron or nonferrous, older type foundry, loose pattern, slinger or modern mechanized foundry. Know incentive systems, sand control, cores, dry sand, rigging, maintenance and metallurgy. Castings to 10 tons. Will work with someone approaching retirement. More than average experience and ability. Under 40. Address: Box 775, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

FOUNDRY MANAGER AND METALLURGIST
Presently managing gray iron foundry seeking new affiliation with progressive gray iron or malleable foundry or sales organization. Experience in management, technical sales and operational phases of gray iron and malleable. Age 36. Address: Box 765, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

FOUNDRYMAN
Now employed as molding foreman for large company producing precision and pressure tight gray iron castings. Well versed in all departments. Eleven years experience, age 30, married. Desire to relocate. Address: Box 772, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

MANAGER SUPERINTENDENT
Practical gray iron foundryman, technically trained graduate metallurgist with broad background of experience producing quality castings at minimum costs. Well versed in all departments. Can produce results. Address: Box 784, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

SUPERINTENDENT OR MANAGER
Progressive foundryman familiar with every phase of practical experience on all classes of work. Now employed. Would like to make change. Address: Box 774, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

MANAGER-SUPERINTENDENT
Thorough knowledge of all phases of foundry operations and administrative functions. Desire opportunity where challenge exists. Age 38. Address: Box 777, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

MANUFACTURING SUPERINTENDENT
With metallurgical background well versed in all phases of gray iron production foundry, cost and quality minded, presently with a leading manufacturer of tractors and farm implements. Seeking similar position with a modern progressive organization. Address: Box 739, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

SUPERINTENDENT
Progressive foundry manager. Familiar with every phase of the industry. Background of practical experience on all classes of ferrous and nonferrous work. Address: Box 748, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

Positions Wanted

SUPERINTENDENT OR MANAGER
Young foundryman thoroughly versed in all gray iron operations, degree in Metallurgical Engineering. Interested in responsible position with opportunity. Address: Box 763, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

METALLURGICAL ENGINEER
Professional. M.S. degree. Thirty-five years' diversified iron and steel foundry experience. Proven ability for plant improvement, cost savings, trouble shooting. Exceptional references. Address: Box 788, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

FOUNDRY MANAGEMENT
Experienced production supervisor in automotive foundry including pouring and finishing operations. Chief inspector in ferrous and nonferrous foundry. Three years' experience in shell molding. Graduate industrial engineer. Address: Box 718, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

SUPERINTENDENT OR MANAGER
Young foundryman thoroughly versed in all gray iron operations. Degree in Metallurgical Engineering. Interested in responsible position with opportunity. Address: Box 790, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

PERMANENT MOLD ENGINEER
Graduate Metallurgist with diversified nonferrous experience seeking connection offering responsibility for Aluminum permanent mold design and/or operations. Address: Box 751, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

GRAY IRON OR SEMI-STEEL FOUNDRYMAN
Wish a position either as manager, superintendent or salesman. Experience of 35 years as molder, coremaker, assistant superintendent, salesman and foundry owner. On heavy machinery, automotive dies and production castings. Address: Box 762, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

SUPERINTENDENT OR GENERAL FOREMAN
Experienced in all foundry departments, brass, bronze and aluminum, in all die casting departments and finishing. 24 years' experience. Age 45. Address: Box 766, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

SUPERINTENDENT—STEEL FOUNDRY
Ten years' experience. Well versed in all phases of foundry operations. Will relocate. Address: Box 769, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

PERMANENT MOLD DESIGNER
Aluminum. 25 years experience, capable of heading entire operation. Address: Box 783, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

Foundry Consultants

CONSULTING ENGINEER
Thirty-five years' Experience
Acid and Basic Practice
Improved methods in electric furnace melting. Low cost with high productivity. Avoid expensive mistakes. Acquire consultation prior to the purchasing of your new furnace and in planning, modernizing, and organizing of your melt shop.
EUGENE H. WEAK **2933 HIGHWAY AVE.**
HIGHLAND, IND. **PHONE: TEMPLE 8-1244**

FOUNDRY CONSULTANT-NONFERROUS
Sand — permanent mold — centrifugal permanent mold — and centrifuge permanent mold. High pressure castings a specialty. Address: ED JENKINS, RT. #3, BOX 345, WALKERTON, INDIANA, PHONE: 712W.

Representatives Wanted

SALES REPRESENTATIVE
Old established Malleable Foundry would like to engage Sales Representative to sell malleable and gray iron castings on straight commission basis. Write for details and possible interview to:
BOX 756, FOUNDRY
PENTON BLDG. **CLEVELAND 13, OHIO**

MANUFACTURERS' REPRESENTATIVE
For Western Pennsylvania territory to sell ferrous and nonferrous precision investment castings and machinery services for a nationally known manufacturing company. Commission on exclusive territory basis. Prefer man with metallurgical or other engineering background. Submit resume immediately to: BOX F 1547, 125 W. 41 ST., N.Y.C. Interviews will be held in N.Y.C.

SALES REPRESENTATIVES
Leading investment casting company has $1,000,000 annual open capacity in new plant. Looking for sales engineers on commission basis now carrying allied lines in the following areas: Illinois, Wisconsin, Eastern upstate New York, New England and Eastern Pennsylvania. Address: Box 721, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

SALES REPRESENTATIVE WANTED
Highly mechanized malleable and gray iron foundry in Great Lakes District. Interested in commission salesman. Send resume of experience. Address: Box 712, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

REPRESENTATIVE WANTED
Salesman now calling on pattern shops. Additional new line available. Will not conflict. Please give resume. Address: Box 764, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

Representatives Available

FOUNDRY REPRESENTATIVE
Experienced in estimating and selling castings in New Jersey-New York area. Want exclusive set-up. Technical background. Address: Box 782, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

SALES ENGINEER
Wants to represent gray iron and steel foundries in Chicago area. Commission basis. State foundry facilities and size. Address: Box 781, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

FOUNDRY SUPPLY HOUSE
Covering New York State area, desire additional lines. Address: Box 785, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

Wanted-To-Buy

WANTED FOUNDRY EQUIPMENT
Foundry investment organization needs used foundry equipment to activate and mechanize a large foundry. Complete foundry without property will be considered. Please furnish complete information regarding age, condition, price, and when inspection can be made.
BOX 743, FOUNDRY
PENTON BLDG. **CLEVELAND 13, OHIO**

CUPOLA AND BLOWER WANTED
Used #2½ or #3 Whiting cupola with or without blower. State price and condition. Address: Box 779, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

MIXER WANTED
Used Simpson Intensive Sand Mixers. State size, condition and lowest cash price for immediate acceptance. Address: Box 578, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

CLASSIFIED ADVERTISING

Opportunity

PERMANENT MOLD METHOD AVAILABLE

THE WAGNER PERMANENT MOLD CO., 2910 Empire Ave., Burbank, California, has developed a Permanent Mold Method for ferrous and non-ferous metals and invites inquiries from any country regarding this method and process.

CHARLIE AMMEN'S FOUNDERS CORRESPONDENCE SCHOOL OFFERS

A simple complete course in founding stressing the small details, practices and variables involved in the basic operations necessary to the production of quality castings. Address: Box 776, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

Foundry Wanted

FOUNDRY WANTED

GROUP OF FOUNDRY ENGINEERS AND INDEPENDENT MANUFACTURERS WANTS TO PURCHASE LARGE FOUNDRY OR SEVERAL SMALL FOUNDRIES (FERROUS AND NON-FERROUS) WITH OR WITHOUT PROPERTY. MUST HAVE OWNERSHIP BEFORE JANUARY 1ST, 1958. PLEASE SUBMIT COMPLETE DETAILS AS TO CAPACITY, TYPE OF PRODUCTION, FOUNDRY EQUIPMENT, FLASK INVENTORY AND TRANSPORTATION FACILITIES.

PRINCIPALS ONLY
ALL REPLIES CONFIDENTIAL
BOX 742, FOUNDRY
PENTON BLDG. CLEVELAND 13, OHIO

Foundry For Sale

FOR SALE, LEASE, OR JOINT VENTURE

Going nonferrous, specialty foundry and polishing shop. Two oil furnaces. Established eighteen years, brick building. Address: HODGE & SHERMAN, AGENCY, 304 FIRST NATIONAL BANK BUILDING, ELKHART, INDIANA.

For Sale

FOR SALE

#125 CUPOLA, Whiting #5, (NEVER USED AND NOT LINED) with melting rate 6¼ tons per hour, complete with front slagging spout; spark arrester; fabricated shell; Spencer 1750-H overhung type centrifugal blower, 4350 CFM with 50 H.P., 3500 RPM motor; Foxboro automatic air weight control system with single phase 60 cycle, 110 volt, A.C. chart movement; vertical side dump skip hoist charger with channel track, roller bearing sheaves, 7½ V hoist unit, 5 H.P. hoist motor with brake, and 18.75 Cu. ft. bucket; mechanical charging opening frame with ring sill casting, 14½" bottom radius x 50" long U-type mixing ladle with EZ pouring gearing, approx. capacity 1800# iron; balanced type charging car 3'0" x 4'0"; and complete set of Laclede-Christy lining.

#141 Sandslinger, Beardsley & Piper, 120" sw., 48" vert., Portable type with car wheels on roller bearings. Serial No. 900462610 including repair parts. Motor 1150 & 1720 RPM.

ROBERT HOLMES & BROS., INC.
510 - 520 JUNCTION AVENUE
DANVILLE, ILLINOIS

MOLDING MACHINE

Herman 6000# capacity, jolt-roll-draw in operating condition. Asking $2900 f.o.b. Address: POTTSTOWN MACHINE CO., POTTSTOWN, PA. (Phone 37, H. H. Houston)

For Sale

For Sale

No. 0 SIMPSON INTENSIVE MIXERS

NEVER USED

STYLE: M DIAMETER: 3' CAPACITY: 1¾ cu. ft.

Acquisition Cost: $2935.

OUR PRICE: $1495. Complete with 5 h.p. motor and drive

UNIVERSAL MACHINERY & EQUIPMENT COMPANY
1630 NORTH NINTH STREET READING, PA.
Phone: 35103 Collect

SAND BLAST EQUIPMENT
SELL—BUY—TRADE
GUARANTEED MACHINES
TERMS: 3 YEARS TO PAY

9' LG-14 Pangborn Table	$4500.00
6' LE Pangborn Air Table	800.00
Pangborn 53 EN2 Hand Cabinet	325.00
Pangborn Auto Peening Cabinet	1100.00
48 x 48 Wheelabrator Tumblast	5000.00
42 x 48 Wheelabrator Tumblast	1500.00
36 x 42 Wheelabrator Tumblast	2000.00
27 x 36 Wheelabrator Tumblast	2750.00
15" Continuous Wheelabrator Tumblast	2000.00
8' Wheelabrator Table Blast	2000.00
6' Wheelabrator Table Blast	3000.00
4' Wheelabrator Table Blast	2500.00
Vapor Blast Cabinets	400.00

All types and sizes of Hand Cabinets, Dust Collectors, Pressure tanks, Rooms, Horizontal or Vertical Tumbling Barrels and additional Sand Blast Equipment too numerous to mention.

DIAMOND SALES INC.
5634 W. JEFFERSON
DETROIT 9, MICHIGAN
VI-36750
We Will Buy one piece or your entire plant

FOR SALE

333 KW Ajax-Northrup Induction Melting Equipment:

Condition	**Good (1935)**
Availability	**Immediate**
Location	**Cleveland, Ohio**

Consists of:
1. Generator—333 KVA, .9 P.F., 1800 RPM, 800 Volts, 960 Cycles w/Exciter. Motor—500 HP, 2300 Volts, 3 Phase, 60 Cycle 1.0 P.F. Synchronous w/Exciter.
2. Starting Control Panel and Compensator
3. Generator Control Panel
4. 333 KW Capacitor Bank Assembly
5. Throwover Switch Panel
6. 2—300# Induction Melting Furnaces
7. 2—2000# Induction Melting Furnaces

Above equipment in daily service, until removed and warehoused (1957) and under monthly inspection by manufacturers representatives. Unit replaced in new facility by similar equipment of larger capacity.

BOX 787, FOUNDRY
PENTON BLDG. CLEVELAND 13, OHIO

FOR SALE

1—Allis Chalmers Dielectric Core Oven
Type 15-CH High Frequency Electronic Heater
S/N 9-1510-00029-1
Capacity 650 lbs. core per hour
Equipped with 1 gear reducer
1—1½ H.P. master gear motor
1—1½ H.P. G. E. motor
In good condition

CENTRAL FOUNDRY DIVISION
GENERAL MOTORS CORPORATION
SAGINAW, MICHIGAN

FOR SALE

20 KW Ajax convertor with 2 power factor correction capacitors. One 17# melting furnace and mercury table. Asking $2500.00.

CONNECTICUT INVESTMENT CASTING CORP.
ISLAND ROAD
STONINGTON, CONNECTICUT

POWER EQUIPMENT CO.
OFFERS
BARGAIN PRICES
ON GUARANTEED
NEVER USED AND REBUILT
MOTORS!

NOVEMBER SPECIALS
REBUILT MOTORS

HP	Make	Type	Speed
300	West. Open S.B.	CS-1002	600
200	Cont., TEFCBB		1800
200	LA. TEFCBB	JX-137	1200

Send for our FREE Catalog

Cash for your surplus new & used electric equipment
Send your list today.

Large line of motors, control equipment, AC & DC Generators, MG sets and transformers.

Phone GEnesee 8-5629

POWER EQUIPMENT CO.
8 Cairn St., Rochester 2, N. Y.
Phone GEnesee 8-5629

FOR SALE
MOTORS—GENERATORS
TRANSFORMERS
Unused—Rebuilt
WORLD'S LARGEST INVENTORY
ELECTRIC EQUIPMENT COMPANY
Phone station Collect GLenwood 3-6783
P.O. Box 51—Rochester 1, New York

FOR SALE

Complete Palmer-Bee conveyor system. Has one 180° turn with variable-speed drive unit, one 180° turn with take-up unit, two 180° turns with idlers six 90° turns with idlers, 450' of track, chain and 95 carriers, each suitable for holding two 15" x 20" shell molds. Equipment has had little use and is in excellent condition. Priced reasonably. ADDRESS: CARLSON PATTERN SHOP, INC., 616 BERKSHIRE AVE., SPRINGFIELD 9, MASSACHUSETTS.

FOR SALE

One Lindberg Fisher Model MNP 2000 magnesium electric tilting oil fired furnace. Like new and priced very low. Address: STELAR ALUMINUM CASTING CO., 105 BLACKMAN ST., CLINTON, IND. PHONE 1253.

FOR SALE

One Whiting No. 0 cupola with blower and motor, new 1953. Used less than a week. Subject to prior sale. Address: Box 773, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

SURPLUS EQUIPMENT

Connersville blower with 30 HP induction motor. Foxboro control. Arcade molding machines, portable, squeeze. Whiting screen type dust collector. Howe platform scale. Address: P.O. BOX 54, STATION E, ATLANTA, GEORGIA.

FURNACES FOR SALE

Ten used heat treating furnaces and two 7-ton gantry cranes. Good condition, priced to sell. Address: BAER STEEL PRODUCTS, INC., BOX 1428, BOISE, IDAHO.

CONVEYORS

OSCILLATING

Link-Belt Double Deck 72′ x 24″
Hewitt-Robins Single Deck 42′ x 18″
Hewitt-Robins Single Deck 18′ x 10″

CAR TYPE MOLD

Link-Belt 114 Cars, 18″ x 42″—400′ Track

WET SLAGGING

Whiting 14′ L, w/drive, 2 Slag Cars

BLAST CLEANING EQUIPMENT

15″ CONTINUOUS TUMBLAST 4 Tons/hr.
36″ CONTINUOUS TUMBLAST 15 Tons/hr.
48″ x 48″ TUMBLAST WITH SKIP LOADER
48″ x 42″ TUMBLAST WITH SKIP LOADER
36″ x 42″ TUMBLAST WITH SKIP LOADER
NO. 1 MULTIPLE TABLAST
36″ x 36″ x 72″ WHITING TUMBLING MILL w/drive
42″ x 42″ x 72″ WHITING TUMBLING MILL w/drive
36″ x 72″ WHITING TUMBLING MILL w/drive
AMERICAN AIRBLAST PRESSURE CABINET, MODEL 4K

ROTOCLONES

AMERICAN 20D ROTOCLONE WITH HOPPER TYPE F
AMERICAN TYPE 24W ROTOCLONE WITH PRECLEANER
AMERICAN TYPE 30W ROTOCLONE WITH SLUDGE EJECTOR
AMERICAN TYPE N ROTOCLONE 30,000 CFM
AMERICAN TYPE N ROTOCLONE 24,000 CFM
AMERICAN TYPE N ROTOCLONE 22,000 CFM

SHAKEOUTS

SIMPLICITY—3′ x 8′
SIMPLICITY—4′ x 10′
SIMPLICITY—5′ x 8′
SIMPLICITY—8′ x 10′ Dual

HEAT TREATING FURNACES

BOX TYPE

TATE-JONES—36″ x 84″ x 19″ Oil
HOMES, BUZZER—30″ x 18″ x 18″ Gas
STEWART—16″ x 12″ x 48″ Oil
STEWART—24″ x 14″ x 60″ Oil
STEWART—30″ x 16″ x 60″ Oil

FORGING

HOLCROFT-ROTARY—12′ I.D., Gas (Never used)

ROLLOVERS

1500 # HERMAN HIGH SPEED 30″ x 48″, TABLE
3000 # HERMAN 40″ x 58″, TABLE
10,000 # HERMAN 60″ x 84″, TABLE
800 # OSBORN 16″ x 22″, TABLE, MODEL 2047
3000 # TABOR 40″ x 54″, TABLE
4000 # TABOR 42″ x 60″, TABLE

CORE ROLLOVERS

CHAMPION—TYPE W, 22″ x 8″ DRAW
CHAMPION—TYPE W, 22″ x 12″ DRAW
DEMMLER—MODEL 2P, CORE BOX 20″ Wide x 13″ DRAW

AUTOMATIC SHELL MOLD MACHINES

TYPE SU-1, PLATE 26″ x 42″, GAS FIRED
SUTTER, SP1100, PLATE 26″ x 41″, GAS FIRED

PARTIAL LISTING

CALL US COLLECT

WHITEHEAD

EQUIPMENT CORP.

P.O. BOX 939 READING, PA.

PHONE: FRanklin 5-4379

Circle 871 on Page 51

For Sale

FOR SALE

TABOR, jar rollover, power draw, table 22x42, 600 lb. cap.
OSBORN, jolt rollover, table 30x40
INT., rollover, 30x8, portable
INT., rollover, 24x10, portable
INT., rollover, 30x8, portable, no jolt
DAVENPORT, #28SA, jolt rollover
J & J, rollover 24x30
10—OSBORN 275J, Squeezers, portable
2—OSBORN 275J, Squeezers, Stationary
2—CHAMPION Model JS-10S Jolt Squeezers
2—MILWAUKEE Squeezers, Stationary
2—INTERNATIONAL Squeezers, Portable
6—ARCADE Model 100S Jolt Squeezers, Stat.
HERMAN Jolt Stripper, 48x54
INTERNATIONAL Plain Jolt, 36x45 Table
NICHOLS Plain Molding Machine, High Speed
SPO Model 506 SP-2, Jolt rollover, Pattern Draw, Pin Lift, 22x26 table
3—INT. TYPE R, Core Maker Rollovers, Hand
INTERNATIONAL Core Blower SB 13
INTERNATIONAL Core Blower SB 11
CHAMPION Core Blower CB 18
DEMMLER Core Blower Style 1
DEMMLER Core Blower Style 2
PORBECK Core Oven Drawer Type
3—COLEMAN Core Ovens Drawer Type
CLIMAX Wire Straightener No. 2
ROYER Screenarators
SIMPLICITY Screenarators
SAND MIXERS, paddle type
GRINDERS, 1 hp. to 25 hp.
DISC GRINDERS
POURING DEVICES & DISTRIBUTORS
LADLES ALL TYPES 50 lb. to 5000 lb.
GYRATORY RIDDLES, 20″ to 24″
MONORAIL & BRIDGES
AIR HOISTS, 500 lb. to 4000 lb.
OVERHEAD CHAIN CONVEYOR, #458 and DRIVES
BLOWERS ALL SIZES, CENTRIFUGAL & POSITIVE
DUST COLLECTORS, ALL SIZES
TRANSITE CORE PLATES, ALL SIZES
FLASKS—THOUSANDS IN STOCK—ALL SIZES STEEL—ALUMINUM—JACKETS

MANY OTHER ITEMS IN STOCK
SEND US YOUR INQUIRIES
WE BUY — SELL — TRADE

HOMAN MACHINERY COMPANY
710 E. FRONT ST.
CINCINNATI, OHIO
MAin 1-0339

HEAT TREATING EQUIPMENT
DESPATCH OVEN CO.

1—Model DT-26 "Pot Type" Re-circulating, Gas fired, basket size 35″ dia. x 28″ depth, Pit type, 1250° F. with automatic controls.

2—Model DT-31 "Pot Type" Re-circulating, Gas fired, basket size 36″ dia. x 36″ depth, pit type, 1250° F. with automatic controls.

LINDBERG ENGINEERING CO.

2—Model 2236-FH "Cyclone Type" Electric operated, 52KW, basket size 22″ dia. x 36″ depth, Pit type, 1250° F. with automatic controls.

1—Model 3360-G17 "Super Cyclone Type," gas fired, basket size 33″ dia. x 60″ depth, pit type, 1750° F. with automatic controls.

OHIO CRANKSHAFT CO.

1—Tocco 20 KW Induction Heating Unit, single station, 40 HP motor and 9600 cycle generator, Serial No. TJ 611.

1—Tocco 20 KW Induction Heating Unit, two station, 40 HP motor and 9600 cycle generator, Serial No. TJ 461.

SURFACE COMBUSTION CO.

1—Model LO—54 x 96 Box type, Gas fired convection, Min. temp. 600° F. Max. temp. 1850° F. Dimensions 8′ W x 10′ L x 8′ H.

LOFTUS ENGINEERING CO.

1—Annealing Type, walking beam, gas fired, recirculating, 1600°, complete with all necessary controls, motors and blowers; equipped to handle 17 baskets 2′ wide x 2′ deep x 4′ long, overall dimensions 45′ long x 10′ wide x 12′ high. New 1951.

GENERAL FOUNDRY MACHINE CO., INC.
P.O. BOX 2344—CLEVELAND, OHIO
PHONE—LI 1-5365

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classified
advertising dept.
Foundry ★
Cleveland 13, O.

For Sale

FOR SALE

#2 SIMPSON MIXER—LOADER, USED ONLY TWO YEARS, NEW GUARANTEE, LESS THAN HALF COST.

Carl Mayer Core Oven—48" wide; 32" deep; 51" high $250.00
Aluminum Melting Furnaces—Hand Tilting:
400# cap .....each 250.00
500# Aluminum Holding Furnaces each 250.00
International Core Blower-Model SB-11 350.00
#193 and #94 Osborn Core Blowers

MOLDING MACHINES

#213-2114-2136 SPO
#720 U Osborn—11" sq.
Tabor 30" x 40"; 12" draw; shockless 1000#
#601-602-605 Osborne
#216-6 Milwaukee Jolt Squeeze Draw Machine 2000# jolt; 12" draw; 31" table

FURNACES

2000# Stroman—Tilting Hyd. Alum. Melting
2000# Fisher—Aluminum
350# Detroit Rocker Barrel
Stroman Reverberating 300# Alum; 900# Brass Cap.

MISCELLANEOUS

#42 Osborn Hand Rollovers
Simpson Laboratory Mixer
Charging unit for open hearth

FOR THE BEST DEAL CALL

BALCHER MACHINERY COMPANY
695 E. 152ND STREET
CLEVELAND 10, OHIO
TELEPHONE: GLENVILLE 1-2474

FOR SALE

1—Simpson #0 Muller—Style M (never used).
1—Lancaster Stainless Steel Counter-Current Batch Mixer, Type LW-62.
1—Lancaster Mixer, Model EBG-4.
1—Lancaster Mixer, Model EAG-3.
1—Ingersoll Rand Air Compressor, Type PRE-2, 24" x 16", 100# pressure with 300 HP motor.
3—Link Belt Roto-Louver Rotary Dryers, Models: 207-10; 310-16 and 502-20.

R. GELB & SONS, INC.
U.S. HIGHWAY 22, RAHWAY VALLEY R.R.
UNION, NEW JERSEY

FOR SALE

2—AIRCO ACETYLENE GENERATORS. Serial numbers 14180 and 15125. Capacity 300 cu. ft. gas per hour; 300 lbs. 1¼" x ⅝" nut. Can be inspected at Buchanan, Michigan plant.

CLARK EQUIPMENT COMPANY
BUCHANAN, MICHIGAN

FOR SALE

One American Sand Cutter Model M, size 89/70 in excellent condition. Price $700.00. Address: T. W. KELLER, INC., 806 W. FIFTH ST., LANSDALE, PENNSYLVANIA.

For Sale

FOR SALE

350 KW Ajax-Northrup Induction Melting Equipment:

Location	**Cleveland, Ohio**
Condition	**New—Uninstalled**
Availability	**Immediate**

1. Generator—350 KW, 1.0 P.F., 1800 RPM, 800 Volts, 960 Cycle—Air Cooled Motor—500 HP, 4800 Volts, 3 phase 60 Cycle 1.0 P.F. Synchronous Motor and Generator on common frame w/coupling.
2. Magnetic reduced voltage-starting equipment (interrupting capacity 250,000 KVA)
3. Generator and Exciter Control panel complete.
4. 2 Ea.—175 Kw Furnace Feeder Panels—Complete.
5. 2 Ea.—175 Kw Capacitor Bank Assemblies.
6. 2 Ea.—500# capacity Nose Tilting Furnaces Complete.
7. 2 Ea.—1000# capacity Nose Tilting Furnaces —Complete.
8. 3 Ea.—2 way Throwover panels—arranged for simultaneous operation of 2—500# Furnaces, @ 175 Kw each or, unit operation of either 1000# Furnace @ 350 Kw.

BOX 786, FOUNDRY
PENTON BLDG. CLEVELAND 13, OHIO

REPAIR AND REBUILDING SERVICE ON ALL PNEUMATIC TOOLS

We try to keep on hand a stock of **"Hard Chrome Rebuilt Foundry Tools"** such as Rammers, Chipping Hammers and Core Breakers. Our prices are about **One-half** the cost of new tools. All tools sold by us are guaranteed and can be returned if not found satisfactory.

CENTRAL PNEUMATIC SERVICE COMPANY
512 LINDEN AVENUE
DAYTON 3, OHIO

FOR SALE

1 used #7 Roots Connersville Blower 10,000 CFM capacity, V-belt driven by 100 H.P. Westinghouse 3 phase, 60 cycle, 220/440 volt motor with manually operated variable speed controls. Excellent operating condition.

BOX 716, FOUNDRY
PENTON BLDG. CLEVELAND 13, OHIO

CHARLIE AMMEN'S NONFERROUS RECIPES A collection of Patinas, washes, binders, sand, core, metal mixes and assorted dope. $7.00. Address: C. W. AMMEN, 8126 UTAH ST., OAKLAND, CALIFORNIA.

For Sale

PANGBORN
AIR BLAST CLEANING UNITS
WALKING BEAM TYPE

These units were designed to clean Automotive Rear Axle Housings:

Complete With:
Pangborn "C-H 2" Cloth Dust Collector—11,000 CFM
(2) Two Continuous Type Pressure Tanks (SAE) Abrasive Separator and Elevators
All Necessary Motors, Controls, Duct Work, Muffles, etc.

LATEST TYPE EQUIPMENT
Excellent Condition
(2) Systems Available
May Be Inspected in Plant Location

CONTACT:
H. H. LANDAY
GLOBE TRADING COMPANY
1815 FRANKLIN STREET
DETROIT 7, MICHIGAN
WOODWARD 1-8277

FOR SALE

#2A Climax Wire Straightener, including speed reducing unit sheaves and V-belts and a 1 H.P. motor, but less motor, wiring and electrical equipment. Like new—$600.00.
Globe Producting Lift—4000# load on 122 p.s.i., speed of rise approx. 9 FPM. Electric motor pump unit is an integral part. Never used—$1,380.00

NATIONAL-U. S. RADIATOR CORPORATION
P.O. BOX 711
NEW CASTLE, PENNSYLVANIA

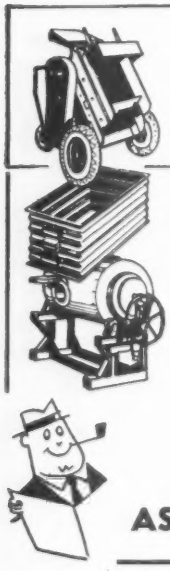
FOR SALE
OPERATING

Industrial and Marine Hardware Business. Drop Forge Plant and Dies. Patterns for Malleable, Gray Iron and Brass. Eastern U. S.

BOX 789, FOUNDRY
PENTON BLDG. CLEVELAND 13, OHIO

FOR SALE

2 Used Model "L" Beardsley & Piper Screenarators both in very good condition. 3 phase, 60 cycle, 220 volt, motors. One is six years old, price $500.00. One is one year old, price $1500.00. Prices f.o.b. Little Falls, New Jersey. Address: NORTH JERSEY FOUNDRY CO., INC., 453 MAIN STREET, LITTLE FALLS, NEW JERSEY.



EUCLID FOUNDRY & MACHINE EQUIPMENT CO.

14919 SARANAC ROAD **CLEVELAND 10, OHIO**

OSBORN ROLLOVERS:

5—405, 18" to 26" draw, air clamps, 3500# capacity

TUMBLING MILLS:

1—36" x 54" Royersford, belt driven
2—32" x 68" & 50" x 80" Sly

WHEELABRATORS

1—20" x 27" 2 cu. ft.
1—36" x 42" air blast Wheelabrator

MULLERS

1—610 Clearfield 14 cu ft. capacity
2—3 Simpson 30 cu ft. capacity

SWING GRINDERS

10—10 H.P. Mummert-Dixon Model 1814
3—25 H.P. Safety Grinding Wheel Model 204

ELECTRIC FURNACES:

1—80 lbs. Detroit Rocking
1—350 lbs. Detroit Rocking

ASK FOR OUR COMPLETE LISTING — GLENVILLE 1-1222

AAA MACHINERY & EQUIPMENT CO.

over 1000 satisfied customers

WORLD'S LARGEST INVENTORY OF GUARANTEED FOUNDRY EQUIPMENT

AIR COMPRESSORS

1—SULLIVAN angle compound, 600 CFM.
3—INGERSOLL RAND, Mouel ES-1. Size 9 x 9. 225 CFM, 40 HP motor.
1—SCHRAMM WD-50, 15 HP, 50 CFM.

AIR & ELECTRIC HOISTS

15—DETROIT Air Hoists, 1 & 1½ ton cap.
2—P&H and DETROIT Model LHR, 5 ton.
20—THOR air hoists, ½, 1 & 2 ton cap.
85—INGERSOLL RAND Air Motor Type. Sizes RC-5, A, B, C, D-6, ¼, ½, 1 and 3 ton capacity.
4—KELLER 1 ton capacity air hoists.
1—SHAW BOX 2 ton load lifter.
2—YALE ½ ton.

BUCKET ELEVATORS

12—LINK BELT & JEFFREY, 30, 40, 50, 60 ft. cc, 10 x 7, 12 x 7, 14 x 7 buckets.

CUT-OFF MACHINES

2—AMERICAN D Rod Straighteners.
1—DeWALT ME2 & H, 16 HP, 24" Blade.
1—GROB Band Saw, Type OS-36.
3—TESSEMER H & I Sprue Cutters.

CORE BLOWERS

3—CHAMPION Model CB-10, CB-18, & CB-400. From 10 to 300 lb. Cores.
22—DEMMLERS Model Nos. 1, 1E, 2, 2E, 2K, 3, 3E, 3K, 4, & 4E. From 10 to 100 lb. Cores.
7—INTERNATIONAL Model SB-11 & SB-13, SB-15H, 15 to 30 lb. Cores.
6—OSBORN Nos. 91, 92, 192 and 193. From 10 lb. to 75 lb. cores.
3—REDFORD & MILWAUKEE Bench.
1—SPO Model SC-10-DM Shell Core Blower
1—SAN-BLO, Model CB-40-B, 40# cores.

CORE OVENS

4—CARL MAYER 2-Compartment, oil fired, I.D. 7' W x 14' deep x 8' H each.
1—INDUSTRIAL "Revolving Carriers" continuous, 18" x 80" trays.
2—PORBECK Model C-3-C, Double Drawer Type. Gas fired, new in 1955.

CUPOLA BLOWERS & EQUIP.

1—SPENCER 150 HP 7500 CFM 48 oz.
6—I & R Centrifugal 30, 50, 85 and 100 HP, 3500 to 10,500 CFM w/blast gates.
1—ROOTS 7,000 CFM, 50 HP motor.
14—LINDBERGS. From 1 HP to 15 HP, 160 to 2100 CFM.
1—MODERN No. 3½ Cupola
1—CUPOLA Bondactor, style 1250-L.
1—WHITING No. 6 Cupola.

ROTO-CLONES WET TYPE

9—AMERICAN AIR FILTER Type N&W, Sizes No. 10, 14, 20, 24, 27, & No. 30, w/sludge ejectors, cap. to 30,000 CFM.

ELECTRIC MELTING FURNACES

1—AJAX 20 KW Induction Unit.
1—TOCCO 20 KW Induction Unit.
3—AJAX No. 300 & 500 Furnaces Only.
1—BOOTH one ton, direct arc, side charge with 1500 KVA Transformer with gear and all controls.

GAS & OIL FIRED FURNACES

23—LINDBERG FISHER Model MNP Electric Tilting. Sizes 150, 300, 400, 600, 1700, 2000 & 2400#, aluminum capacities, Gas or Oil Fired.
5—LINDBERG FISHER Type BBI Hand Tilting Furnaces, Sizes 100, 125, 225.
29—LINDBERG FISHER & CAMPBELL HAUSFELD Stationary, Sizes 100, 150, 200, & 550 capacity, Gas or Oil Fired.
1—STROMAN Model JC Cradle Type Hydraulic tilt, 2000# capacity. Grey Iron.

HEAT TREAT FURNACES

1—DESPATCH Model DT-26, 38" diameter x 26" height, gas fired recirculating, 1250°, pit type
1—SURFACE COMBUSTION, 54" x 96", box-type, gas fired, 1850° F.

GRINDERS

Swing Frame

1—MARSCHKE 20" x 10" wheel, 10 HP.
2—FOX No. 6, 24" x 10", 15 HP.
3—MARSCHKE 24" x 3" wheel, 15 HP.
2—US ELEC. Model 24, wheel 24" x 3".
1—MUMMERT-DIXON #2420, wheel 24" x 3".

Snagging

2—U. S. #64, 20" x 3", 7½ HP, 4 speed.
2—SAFETY #174, 24" x 3" wheel 10 HP.
2—MARSCHKE 24" x 4" wheel, 20 HP.
1—U. S. #65, 30" x 3", 30 HP, 4 speed.

Core

2—MILWAUKEE 70-12, 70" dia. table.
1—STONEY Core Grinder, 16" dia. Wheel.

LADLES

17—MODERN & WHITING Cylindrical Ladles, 275, 1500, 2450, & 3000 lbs. capacity. All Enclosed Gears.
12—MODERN Model F-9 and FA-9 Pouring Devices, with ladles 400 to 800 lbs.
37—MODERN & WHITING Lip Pour, Enclosed Gear, 1200, 1600, 2000, 4000, 6000, 7000, 8000, & 80,000 lbs. capacity.
7—MODERN & WHITING Cylindrical Mixing Ladles. 2 & 3 ton capacities. Electric & Manual Tilting.
7—WHITING Bottom Pour 4 ton.

MOLDING MACHINES

Jolt Squeezers

37—OSBORN, SPO, MILWAUKEE, Portable & Stationary. 10" Squeeze Cyl.
13—OSBORN, MILWAUKEE & SPO Portable & Stationary, 12" Cylinder.
6—MILWAUKEE 18" Cyl., 24" x 36" Table.

Plain Jolt

1—HERMAN 40" x 72" table, 6000# cap.
1—HERMAN 40" x 58" table, 6000# cap.
1—DAVENPORT 24AJ, 24" x 30" table.
1—HERMAN 8' x 12' table, 32,000# cap.

Jolt Rollover Pattern Draw

1—DAVENPORT 28-SA, 29" x 40" table.
2—DAVENPORT 40-SA, 42" x 50" table.
3—HERMAN 1500 lb. Series, 26" x 48".
1—HERMAN 750 lb. Series, 20" x 30".
2—HERMAN 4000 lb. Series, 40" x 60".
14—INTERNATIONAL Type G, Table Sizes 20" x 8", 24" x 10", 30" x 12".
1—INTERNATIONAL RES Size 15" x 8".
2—J & J #612, 24" x 30" Table.
4—J & J #918, 44" x 54" Table.
1—J & J #815-B, 30" x 40" Table.
1—MILWAUKEE #167, 32" x 33" Table.
1—MILWAUKEE #60B-3, 60" Flask.
10—OSBORN #40 and 42 Core Rollovers.
1—OSBORN #442, 21" x 31" Table.
2—OSBORN #242W, 29" x 42" Table.
12—OSBORN #601 & 602, 30" & 36" Wide Flask, 10" Draw, 750 lbs. Cap.
1—SPO #413D, 24" x 25" Table.
1—SPO Model 9336, table size 22" x 28".
1—SPO Model 508, table size 28" x 30".
3—TABOR 30" x 40" Table, 12" Draw.
4—TABOR 22" x 32" Table, 10" Draw.

Jolt Pin Lift

2—DAVENPORT 24-AJS, 24" x 30" Table.
3—INTERNATIONAL JDP 1600 x 10" draw, 36" x 36" table.
2—OSBORN #559, 25" x 30" Table.
2—MILWAUKEE #2542, 38" x 42" Table.
1—SPO #3058, 22" x 28" Table.
1—SPO #3102—42" x 50" Table.

Pin Lift

9—INTERNATIONAL & B & P Speed Draw. Used with Sand Slinger. Cap. 600 to 2000 lbs., up to 30" x 40" flasks.

Jolt Squeeze Pin Lift

1—MILWAUKEE No. 216, 22" x 42" table, 21" dia. sq. cyl.
1—MILWAUKEE #125, 21" x 27" Table.
3—MILWAUKEE #165, 24" x 30" Table.
1—OSBORN #712-V, 18" x 26" Table.
2—OSBORN #710-J, 17" x 21" Table.
4—INTERNATIONAL PKL, 17" x 26".
1—SPO #2134, 19" x 27" Table.

CONVEYORS

Steel Apron

9—JEFFREY & LINK BELT 24", 30", 36", 42", & 48" Widths. Length built to your specifications, with reducers & motors.

Oscillating & Vibrating

1—LINK BELT 48" x 154', 20 HP Motor.
4—LINK BELT 30" W x 45', 65' & 80'
1—ROBINS Vibra-Veyor 24" W x 100' long x 8" deep pan, New 1953, like new.
7—JEFFREY TAYLOR No. 5 Vibrating Feeders 24" wide x 7'.

Roller

2500' MATHEWS 6", 12", 18" & 20" wide, 2⅜" dia roller, 11" hex shaft centers, 4" channel.
500—MATHEWS 36" wide, 3½" dia. 1" hex shaft on 6" centers, 6" channel.

Mold

1—LINK BELT 36 cars 4' x 5', 190' track, with automatic dump. New 1952.
3—LINK BELT 88 Cars 20" x 48", 350' track, with automatic dumping.

Belt

LINK BELT & JEFFREY 18", 24" & 30" wide. Flat or trough idlers, all Timken bearings. Built to your specifications. Can be equipped with molders hoppers & ploughs.

MOLDERS HOPPERS & STORAGE BINS

7—NATIONAL & LINK BELT Storage Bins. 60 to 150 tons cap.
42—MOLDERS Hoppers 1½ ton cap.

SAND MULLERS

1—B & P #50, Speed Muller, 9 cu. ft.
1—B & P #60, Speed Muller, 12 cu. ft.
2—B & P #70, Speed Mullers, 18 cu. ft.
1—B & P #7, Mulbaro, 700# cap.
1—BAKER PERKINS #16½, 30 HP.
2—CLEARFIELD No. 610 w/skip hoist loaders, 10 to 14 cu. ft. batch.
2—CLEARFIELD #920, 25-30 cu. ft.
1—DRAVO-DOYLE 6 cu. ft cap. Port.
1—LINK BELT 48" x 8' Paddle Type.
1—PEKAY No. 160-1-24 Mixer Muller, single stage for 24" belt, 230 TPH.
1—SIMPSON #0, Style B, 175 lb.
1—SIMPSON #1, Style UD, 500 lb.
1—SIMPSON #1½, Style UD w/loader.
1—SIMPSON #2, Style C, 1500 lb.
3—SIMPSON #3, Style C, 3000 lb.
3—SIMPSON #3, Style UD, 3000 lb.
2—Mixer Muller, 6 cu. ft. paddle type.

SAND PREPARATORS

2—NATIONAL #3 Style C Aerators.
6—ROYER Complete conditioning units including Shakeout, Belt Conveyor and Sand Blender.
6—B & P Screeenerators, Models S, M & L.
8—ROYER Models, NC-4, NDS, NDP.
6—AMERICAN Sand Cutters, Model M, Sizes 79/60, 89/70, 99/80. All late.
4—AMERICAN Model AA and AM, 45" & 60" Cutting Blade.
1—ROYER S-522-9M Scrap Control 60 ton per hour capacity.
1—AMERICAN "Sand Master," 102"/70" cutting blade—1952.
1—MOULDERS' FRIEND 60" Brush.
1—REDDY-SANDY Model RS-VM.

SANDSLINGERS

1—B & P Motive Jr., 300 cu. ft. tank.
2—B & P Tractor Type 19" head & 16" head, 13' arms. Magnetic towers.
6—B & P Models DB Stationary Sand Slingers, 16", 19" and 22" heads, with 20, 25, 40 and 50 HP motors. All late.
2—B & P Swing Type Slingers 19" head.
1—B & P 2 ton plate feeder.
4—B & P 8 ton plate feeders.
2—B & P 35 ton capacity plate feeders.

SHAKEOUTS & SCREENS

2—LINK BELT 5' x 10', 6 ton cap.
1—ROBINS 8' x 10' Model JF-11 Dual.
2—ROBINS 3' x 5' shakeouts.
1—SIMPLICITY 4' x 10', Model D.
1—SIMPLICITY 6' x 8', Model DE.
1—SIMPLICITY 5' x 8', Model D.
1—NATIONAL ENG. 5' x 8' Hex Screen.
1—HEWITT-ROBINS 36" x 78" Vibrex.
1—SIMPLICITY 4' x 10' Model B, single deck sifter screen, 10 HP motors.
1—HEWITT - ROBINS Vibra - Feeder 36" wide x 60" long.
1—SIMPLICITY 4' x 6' Model B.

SAND BLAST EQUIPMENT

1—AMERICAN 36" x 42", w/Skip Hoist.
2—AMERICAN 48" x 42", w/Skip Hoist.
1—AMERICAN 27" x 36" with skip hoist.
1—AMERICAN 48" x 48".
1—AMERICAN No. 1-B Suction Cabinet.
1—AMERICAN #3 Tablast, 4—48" tables.
1—AMERICAN #1 Tablast, 7—14" tables.
1—AMERICAN No. 2A multi-tableblast.
1—PANGBORN #45, type MT Sand Blast Room 10' L x 8' W x 6' H.
1—PANGBORN No. 53, type EN-2 blast cabinet with dust collector
1—PANGBORN Model 6-LF, 6' diameter plain table with dust collector.

TUMBLING BARRELS

13—SLY & WHITING. All late type units, with gearhead motors and built in magnetic brake, Timken bearings. Following sizes 30" x 60", 36" x 84", 42" x 72", 48" x 72", 48" x 96", 72" x 120".

AAA MACHINERY & EQUIPMENT CO.

15539 SARANAC ROAD—CLEVELAND 10, OHIO—CALL LI. 1-6545

For Sale

FOR SALE

#2 SIMPSON MIXER—LOADER, USED ONLY TWO YEARS, NEW GUARANTEE, LESS THAN HALF COST.

Carl Mayer Core Oven—48" wide; 32" deep; 51" high $250.00
Aluminum Melting Furnaces—Hand Tilting:
400# cap ..... each 250.00
500# Aluminum Holding Furnaces each 250.00
International Core Blower-Model SB-11 350.00
#193 and #94 Osborn Core Blowers

MOLDING MACHINES

#213-2114-2136 SPO
#720 U Osborn—11" sq.
Tabor 30" x 40"; 12" draw; shockless 1000#
#601-602-605 Osborne
#216-6 Milwaukee Jolt Squeeze Draw Machine 2000# jolt; 12" draw; 31" table

FURNACES

2000# Stroman—Tilting Hyd. Alum. Melting
2000# Fisher—Aluminum
350# Detroit Rocker Barrel
Stroman Reverberating 300# Alum; 900# Brass Cap.

MISCELLANEOUS

#42 Osborn Hand Rollovers
Simpson Laboratory Mixer
Charging unit for open hearth

FOR THE BEST DEAL CALL

BALCHER MACHINERY COMPANY
695 E. 152ND STREET
CLEVELAND 10, OHIO
TELEPHONE: GLENVILLE 1-2474

FOR SALE

1—Simpson #0 Muller—Style M (never used).
1—Lancaster Stainless Steel Counter-Current Batch Mixer, Type LW-62.
1—Lancaster Mixer, Model EBG-4.
1—Lancaster Mixer, Model EAG-3.
1—Ingersoll Rand Air Compressor, Type PRE-2, 24" x 16", 100# pressure with 300 HP motor.
3—Link Belt Roto-Louver Rotary Dryers, Models: 207-10; 310-16 and 502-20.

R. GELB & SONS, INC.
U.S. HIGHWAY 22, RAHWAY VALLEY R.R.
UNION, NEW JERSEY

FOR SALE

2—AIRCO ACETYLENE GENERATORS. Serial numbers 14180 and 15125. Capacity 300 cu. ft. gas per hour; 300 lbs. 1¼" x ⅝" nut. Can be inspected at Buchanan, Michigan plant.

CLARK EQUIPMENT COMPANY
BUCHANAN, MICHIGAN

FOR SALE

One American Sand Cutter Model M, size 89/70 in excellent condition. Price $700.00. Address: T. W. KELLER, INC., 806 W. FIFTH ST., LANSDALE, PENNSYLVANIA.

For Sale

FOR SALE

350 KW Ajax-Northrup Induction Melting Equipment:

Location	**Cleveland, Ohio**
Condition	**New—Uninstalled**
Availability	**Immediate**

1. Generator—350 KW, 1.0 P.F., 1800 RPM, 800 Volts, 960 Cycle—Air Cooled Motor—500 HP, 4800 Volts, 3 phase 60 Cycle 1.0 P.F. Synchronous Motor and Generator on common frame w/coupling.
2. Magnetic reduced voltage-starting equipment (interrupting capacity 250,000 KVA)
3. Generator and Exciter Control panel complete.
4. 2 Ea.—175 Kw Furnace Feeder Panels—Complete.
5. 2 Ea.—175 Kw Capacitor Bank Assemblies.
6. 2 Ea.—500# capacity Nose Tilting Furnaces Complete.
7. 2 Ea.—1000# capacity Nose Tilting Furnaces —Complete.
8. 3 Ea.—2 way Throwover panels—arranged for simultaneous operation of 2—500# Furnaces, @ 175 Kw each or, unit operation of either 1000# Furnace @ 350 Kw.

BOX 786, FOUNDRY
PENTON BLDG. CLEVELAND 13, OHIO

REPAIR AND REBUILDING SERVICE ON ALL PNEUMATIC TOOLS

We try to keep on hand a stock of **"Hard Chrome Rebuilt Foundry Tools"** such as Rammers, Chipping Hammers and Core Breakers. Our prices are about **One-half** the cost of new tools. All tools sold by us are guaranteed and can be returned if not found satisfactory.

CENTRAL PNEUMATIC SERVICE COMPANY
512 LINDEN AVENUE
DAYTON 3, OHIO

FOR SALE

1 used #7 Roots Connersville Blower 10,000 CFM capacity, V-belt driven by 100 H.P. Westinghouse 3 phase, 60 cycle, 220/440 volt motor with manually operated variable speed controls. Excellent operating condition.

BOX 716, FOUNDRY
PENTON BLDG. CLEVELAND 13, OHIO

CHARLIE AMMEN'S NONFERROUS RECIPES
A collection of Patinas, washes, binders, sand, core, metal mixes and assorted dope. $7.00. Address: C. W. AMMEN, 8126 UTAH ST., OAKLAND, CALIFORNIA.

For Sale

PANGBORN
AIR BLAST CLEANING UNITS
WALKING BEAM TYPE

These units were designed to clean Automotive Rear Axle Housings:

Complete With:
Pangborn "C-H 2" Cloth Dust Collector—11,000 CFM
(2) Two Continuous Type Pressure Tanks (SAE) Abrasive Separator and Elevators
All Necessary Motors, Controls, Duct Work, Muffles, etc.

LATEST TYPE EQUIPMENT
Excellent Condition
(2) Systems Available
May Be Inspected in Plant Location

CONTACT:
H. H. LANDAY
GLOBE TRADING COMPANY
1815 FRANKLIN STREET
DETROIT 7, MICHIGAN
WOODWARD 1-8277

FOR SALE

#2A Climax Wire Straightener, including speed reducing unit sheaves and V-belts and a 1 H.P. motor, but less motor, wiring and electrical equipment. Like new—$600.00.
Globe Producting Lift—4000# load on 122 p.s.i., speed of rise approx. 9 FPM. Electric motor pump unit is an integral part. Never used—$1,380.00

NATIONAL-U. S. RADIATOR CORPORATION
P.O. BOX 711
NEW CASTLE, PENNSYLVANIA

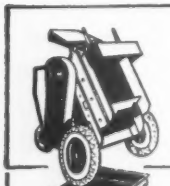
FOR SALE
OPERATING

Industrial and Marine Hardware Business. Drop Forge Plant and Dies. Patterns for Malleable, Gray Iron and Brass. Eastern U. S.

BOX 789, FOUNDRY
PENTON BLDG. CLEVELAND 13, OHIO

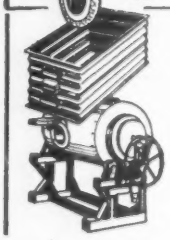
FOR SALE

2 Used Model "L" Beardsley & Piper Screenarators both in very good condition. 3 phase, 60 cycle, 220 volt, motors. One is six years old, price $500.00. One is one year old, price $1500.00. Prices f.o.b. Little Falls, New Jersey. Address: NORTH JERSEY FOUNDRY CO., INC., 453 MAIN STREET, LITTLE FALLS, NEW JERSEY.



EUCLID FOUNDRY & MACHINE EQUIPMENT CO.

14919 SARANAC ROAD CLEVELAND 10, OHIO



OSBORN ROLLOVERS:

5—405, 18" to 26" draw, air clamps, 3500# capacity

TUMBLING MILLS:

1—36" x 54" Royersford, belt driven
2—32" x 68" & 50" x 80" Sly

WHEELABRATORS

1—20" x 27" 2 cu. ft.
1—36" x 42" air blast Wheelabrator

MULLERS

1—610 Clearfield 14 cu ft. capacity
2—3 Simpson 30 cu ft. capacity

SWING GRINDERS

10—10 H.P. Mummert-Dixon Model 1814
3—25 H.P. Safety Grinding Wheel Model 204

ELECTRIC FURNACES:

1—80 lbs. Detroit Rocking
1—350 lbs. Detroit Rocking

ASK FOR OUR COMPLETE LISTING — GLENVILLE 1-1222

AAA MACHINERY & EQUIPMENT CO.

over 1000 satisfied customers

WORLD'S LARGEST INVENTORY OF GUARANTEED FOUNDRY EQUIPMENT

AIR COMPRESSORS

1—SULLIVAN angle compound, 600 CFM.
3—INGERSOLL RAND, Model ES-1. Size 9 x 9, 225 CFM, 40 HP motor.
1—SCHRAMM WD-50, 15 HP, 50 CFM.

AIR & ELECTRIC HOISTS

15—DETROIT Air Hoists, 1 & 1½ ton cap.
2—P&H and DETROIT Model LHR, 5 ton.
20—THOR air hoists, ½, 1 & 2 ton cap.
85—INGERSOLL RAND Air Motor Type. Sizes RC-5, A, B, C, D-6, ¼, ½, 1 and 3 ton capacity.
4—KELLER 1 ton capacity air hoists.
1—SHAW BOX 2 ton load lifter.
2—YALE ½ ton.

BUCKET ELEVATORS

12—LINK BELT & JEFFREY, 30, 40, 50, 60 ft. cc, 10 x 7, 12 x 7, 14 x 7 buckets.

CUT-OFF MACHINES

2—AMERICAN D Rod Straighteners.
1—DeWALT ME2 & H, 16 HP, 24" Blade.
1—GROB Band Saw, Type OS-36.
3—TESSEMER H & I Sprue Cutters.

CORE BLOWERS

3—CHAMPION Model CB-10, CB-18, & CB-400. From 10 to 300 lb. Cores.
22—DEMMLERS Model Nos. 1, 1E, 2, 2E, 2K, 3, 3E, 3K, 4, & 4E. From 10 to 100 lb. Cores.
7—INTERNATIONAL Model SB-11 & SB-13. SB-15H, 15 to 30 lb. Cores.
6—OSBORN Nos. 91, 92, 192 and 193. From 10 lb. to 75 lb. cores.
3—REDFORD & MILWAUKEE Bench.
1—SPO Model SC-10-DM Shell Core Blower
1—SAN-BLO, Model CB-40-B, 40# cores.

CORE OVENS

4—CARL MAYER 2-Compartment, oil fired, I.D. 7' W x 14' deep x 8' H each.
1—INDUSTRIAL "Revolving Carriers" continuous, 18" x 80" trays.
2—PORBECK Model C-3-C, Double Drawer Type. Gas fired, new in 1955.

CUPOLA BLOWERS & EQUIP.

1—SPENCER 150 HP 7500 CFM 48 oz.
6—I & R Centrifugal 30, 50, 85 and 100 HP, 3500 to 10,500 CFM w/blast gates.
1—ROOTS 7,000 CFM, 50 HP motor.
14—LINDBERGS. From 1 HP to 15 HP, 160 to 2100 CFM.
1—MODERN No. 3½ Cupola
1—CUPOLA Bondetor, style 1250-L.
1—WHITING No. 6 Cupola.

ROTO-CLONES WET TYPE

9—AMERICAN AIR FILTER Type N&W, Sizes No. 10, 14, 20, 24, 27, & No. 30, w/sludge ejectors, cap. to 30,000 CFM.

ELECTRIC MELTING FURNACES

1—AJAX 20 KW Induction Unit.
1—TOCCO 20 KW Induction Unit.
3—AJAX No. 300 & 500 Furnaces Only.
1—BOOTH one ton, direct arc, side charge with 1500 KVA Transformer with gear and all controls.

GAS & OIL FIRED FURNACES

23—LINDBERG FISHER Model MNP Electric Tilting. Sizes 150, 300, 400, 600, 1700, 2000 & 2400#, aluminum capacities, Gas or Oil Fired.
5—LINDBERG FISHER Type BBI Hand Tilting Furnaces, Sizes 100, 125, 225.
29—LINDBERG FISHER & CAMPBELL HAUSFELD Stationary, Sizes 100, 150, 200, & 550 capacity. Gas or Oil Fired.
1—STROMAN Model JC Cradle Type Hydraulic tilt, 2000# capacity. Grey Iron.

HEAT TREAT FURNACES

1—DESPATCH Model DT-26, 38" diameter x 26" height, gas fired recirculating, 1250°, pit type
1—SURFACE COMBUSTION, 54" x 96", box-type, gas fired, 1850° F.

GRINDERS

Swing Frame

1—MARSCHKE 20" x 10" wheel, 10 HP.
2—FOX No. 6, 24" x 10", 15 HP.
3—MARSCHKE 24" x 3" wheel, 15 HP.
2—US ELEC. Model 24, wheel 24" x 3".
1—MUMMERT-DIXON #2420, wheel 24" x 3".

Snagging

2—U. S. #64, 20" x 3", 7½ HP, 4 speed.
2—SAFETY #174, 24" x 3" wheel 10 HP.
2—MARSCHKE 24" x 4" wheel, 20 HP.
1—U. S. #65, 30" x 3", 30 HP, 4 speed.

Core

2—MILWAUKEE 70-12, 70" dia. table.
1—STONEY Core Grinder, 16" dia. Wheel.

LADLES

17—MODERN & WHITING Cylindrical Ladles, 275, 1500, 2450, & 3000 lbs. capacity. All Enclosed Gears.
12—MODERN Model F-9 and FA-9 Pouring Devices, with ladles 400 to 800 lbs.
37—MODERN & WHITING Lip Pour, Enclosed Gear, 1200, 1600, 2000, 4000, 6000, 7000, 8000, & 80,000 lbs. capacity.
7—MODERN & WHITING Cylindrical Mixing Ladles. 2 & 3 ton capacities. Electric & Manual Tilting.
7—WHITING Bottom Pour 4 ton.

MOLDING MACHINES

Jolt Squeezers

37—OSBORN, SPO, MILWAUKEE, Portable & Stationary, 10" Squeeze Cyl.
13—OSBORN, MILWAUKEE & SPO Portable & Stationary, 12" Cylinder.
6—MILWAUKEE 18" Cyl., 24" x 36" Table.

Plain Jolt

1—HERMAN 40" x 72" table, 6000# cap.
1—HERMAN 40" x 58" table, 6000# cap.
1—DAVENPORT 24AJ, 24" x 30" table.
1—HERMAN 8' x 12' table, 32,000# cap.

Jolt Rollover Pattern Draw

1—DAVENPORT 28-SA, 29" x 40" table.
2—DAVENPORT 40-SA, 42" x 50" table.
3—HERMAN 1500 lb. Series, 28" x 48".
1—HERMAN 750 lb. Series, 20" x 30".
2—HERMAN 4000 lb. Series, 40" x 60".
14—INTERNATIONAL Type G, Table Sizes 20" x 8", 24" x 10", 30" x 12".
1—INTERNATIONAL RES Size 15" x 8".
2—J & J #612, 24" x 30" Table.
4—J & J #918, 44" x 54" Table.
1—J & J #815-B, 30" x 40" Table.
1—MILWAUKEE #167, 32" x 33" Table.
1—MILWAUKEE #60B-3, 60" Flask.
10—OSBORN #40 and 42 Core Rollovers.
1—OSBORN #442, 21" x 31" Table.
2—OSBORN #242W, 29" x 42" Table.
12—OSBORN #601 & 602, 30" & 36" Wide Flask, 10" Draw, 750 lbs. Cap.
1—SPO #413D, 24" x 25" Table.
1—SPO Model 9336, table size 22" x 28".
1—SPO Model 508, table size 28" x 30".
3—TABOR 30" x 40" Table, 12" Draw.
4—TABOR 22" x 32" Table, 10" Draw.

Jolt Pin Lift

2—DAVENPORT 24-AJS, 24" x 30" Table.
3—INTERNATIONAL JDP 1600 x 10" draw, 36" x 36" table.
2—OSBORN #559, 25" x 30" Table.
2—MILWAUKEE #2542, 38" x 42" Table.
1—SPO #3058, 22" x 28" Table.
1—SPO #3102—42" x 50" Table.

Pin Lift

9—INTERNATIONAL & B & P Speed Draw. Used with Sand Slinger. Cap. 600 to 2000 lbs., up to 30" x 40" flasks.

Jolt Squeeze Pin Lift

1—MILWAUKEE No. 216, 22" x 42" table, 21" dia. sq. cyl.
1—MILWAUKEE #125, 21" x 27" Table.
3—MILWAUKEE #165, 24" x 30" Table.
1—OSBORN #712-V, 18" x 26" Table.
2—OSBORN #710-J, 17" x 21" Table.
4—INTERNATIONAL PKL, 17" x 26".
1—SPO #2134, 19" x 27" Table.

CONVEYORS

Steel Apron

9—JEFFREY & LINK BELT 24", 30", 36", 42", & 48" Widths. Length built to your specifications, with reducers & motors.

Oscillating & Vibrating

1—LINK BELT 48" x 154', 20 HP Motor.
4—LINK BELT 30" W x 45', 65' & 80'
1—ROBINS Vibra-Veyor 24" W x 100' long x 8" deep pan, New 1953, like new.
7—JEFFREY TAYLOR No. 5 Vibrating Feeders 24" wide x 7'.

Roller

2500' MATHEWS 6", 12", 18" & 20" wide. 2⅞" dia roller, 4½" hex shaft centers, 4" channel.
500—MATHEWS 36" wide, 3½" dia. 1" hex shaft on 6" centers, 6" channel.

Mold

1—LINK BELT 36 cars 4' x 5', 190' track, with automatic dump. New 1952.
3—LINK BELT 88 Cars 20" x 48", 350' track, with automatic dumping.

Belt

LINK BELT & JEFFREY 18", 24" & 30" wide. Flat or trough idlers, all Timken bearings. Built to your specifications. Can be equipped with molders hoppers & ploughs.

MOLDERS HOPPERS & STORAGE BINS

7—NATIONAL & LINK BELT Storage Bins, 60 to 150 tons cap.
42—MOLDERS Hoppers 1½ ton cap.

SAND MULLERS

1—B & P #50, Speed Muller, 9 cu. ft.
1—B & P #60, Speed Muller, 12 cu. ft.
2—B & P #70, Speed Mullers, 18 cu. ft.
1—B & P #7, Mulbaro, 700# cap.
1—BAKER PERKINS #16½, 30 HP.
2—CLEARFIELD No. 610 w/skip hoist loaders, 10 to 14 cu. ft. batch.
2—CLEARFIELD #920, 25-30 cu. ft.
1—DRAVO-DOYLE 6 cu. ft cap. Port.
1—LINK BELT 48" x 8' Paddle Type
1—PEKAY No. 160-1-24 Mixer Muller, single stage for 24" belt, 230 TPH.
1—SIMPSON #0, Style B, 175 lb.
1—SIMPSON #1, Style UD, 500 lb.
1—SIMPSON #1½, Style UD w/loader.
1—SIMPSON #2, Style C, 1500 lb.
3—SIMPSON #3, Style C, 3000 lb.
3—SIMPSON #3, Style UD, 3000 lb.
2—Mixer Muller, 6 cu. ft. paddle type.

SAND PREPARATORS

2—NATIONAL #3 Style C Aerators.
6—ROYER Complete conditioning units including Shakeout, Belt Conveyor and Sand Blender.
6—B & P Screenerators, Models S, M & L.
8—ROYER Models, NC-4, NDS, NDP.
6—AMERICAN Sand Cutters, Model M, Sizes 79/80, 89/70, 99/80. All late.
4—AMERICAN Model AA and AM, 45" & 60" Cutting Blade.
1—ROYER S-522-9M Scrap Control 60 ton per hour capacity.
1—AMERICAN "Sand Master," 102"/70" cutting blade—1952.
1—MOULDERS' FRIEND 60" Brush.
1—REDDY-SANDY Model RS-VM.

SANDSLINGERS

1—B & P Motive Jr., 300 cu. ft. tank.
2—B & P Tractor Type 19" head & 16" head, 13' arms. Magnetic towers.
6—B & P Models DB Stationary Sand Slingers, 16", 19" and 22" heads, with 20, 25, 40 and 50 HP motors. All late.
2—B & P Swing Type Slingers 19" head.
1—B & P 2 ton plate feeder.
4—B & P 8 ton plate feeders.
2—B & P 35 ton capacity plate feeders.

SHAKEOUTS & SCREENS

2—LINK BELT 5' x 10', 6 ton cap.
1—ROBINS 8' x 10' Model JF-11 Dual.
2—ROBINS 3' x 5' shakeouts.
1—SIMPLICITY 4' x 10', Model D.
1—SIMPLICITY 6' x 8', Model DE.
1—SIMPLICITY 5' x 8', Model D.
1—NATIONAL ENG. 5' x 8' Hex Screen.
1—HEWITT-ROBINS 36" x 78" Vibrex.
1—SIMPLICITY 4' x 10' Model B, single deck sifter screen, 10 HP motors.
1—HEWITT - ROBINS Vibra - Feeder 36" wide x 60" long.
1—SIMPLICITY 4' x 6' Model B.

SAND BLAST EQUIPMENT

1—AMERICAN 36" x 42", w/Skip Hoist.
2—AMERICAN 48" x 42", w/Skip Hoist.
1—AMERICAN 27" x 36" with skip hoist.
1—AMERICAN 48" x 48".
1—AMERICAN No. 1-B Suction Cabinet.
1—AMERICAN #3 Tablast, 4—48" tables.
1—AMERICAN #1 Tablast, 7—14" tables.
1—AMERICAN No. 2A multi-tableblast.
1—PANGBORN #45, type MT Sand Blast Room 10' L x 8' W x 6' H.
1—PANGBORN No. 53, type EN-2 blast cabinet with dust collector
1—PANGBORN Model 6-LF, 6' diameter plain table with dust collector.

TUMBLING BARRELS

13—SLY & WHITING. All late type units, with gearhead motors and built in magnetic brake, Timken bearings. Following sizes 30" x 60", 36" x 84", 42" x 72", 48" x 72", 48" x 96", 72" x 120".

AAA MACHINERY & EQUIPMENT CO.

15539 SARANAC ROAD—CLEVELAND 10, OHIO—CALL LI. 1-6545

UNIVERSAL REBUILT EQUIPMENT GUARANTEED

AIR COMPRESSORS

COMPLETE STOCK—BURY, PENNSYLVANIA, SULLIVAN, INGERSOLL-RAND —SEND YOUR REQUIREMENTS

BLOWERS

25—CENTRIFUGAL 16 oz., 2 to 5 HP
10—GE, WILBRAHAM-GREEN, FISHER Positive Pressure and Cent, Cupola Blowers

CLEANING EQUIPMENT & TUMBLING BARRELS

1—AMERICAN WHEELABRATOR TUMBLAST, 15" x 20", w/dust collector
1—AMERICAN #1 MULTITABLE TABLAST, 17" Table
1—AMERICAN WHEELABRATOR TUMBLAST, 36" x 42", w/loader & dust collector, Very Late Model
1—AMERICAN WHEELABRATOR TUMBLAST, 48" x 48" w/loader used 9 Mos.
1—AMERICAN WHEELABRATOR TUMBLAST, 42" x 48" w/loader
1—15" Continuous AMERICAN TUMBLAST, 4 tons per hour capcity
1—AMERICAN WHEELABRATOR, 36", Continuous Side Discharge, Two Head, Serial #A95643, New 1953, Used 2 Months
1—PANGBORN TABLAST, 8' Table
10—WHITING 36" x 36" x 72" Round w/gear head motors & brakes
1—WHITING 36" x 72" Round w/gear head motors & brakes
1—SLY, Twin Unit, 40" x 24" Round, 10 HP
1—SLY, 68" x 32" Round

CONVEYORS

1—JEFFERY, 3 compartment, ingot mold
1—LINK BELT, vibrating, double deck, 80' x 24", w/exhaust hood
1—LINK BELT, CAR type mold, 114 cars, 403' track, car size 18" x 42"
2—LINK BELT, 30" Steel Apron Conveyors, 100' Centers
4—SAND ELEVATORS, Various sizes
6—SAND BELTS, 10' ctrs. to 140' ctrs.
2500 FEET—FOUNDRY TYPE ROLLER CONVEYOR—ALL SIZES

CORE BLOWERS

1—CHAMPION CB-12
10—DEMMLER #1, #2, #2A, #2K, #3K, #4E
3—INTERNATIONAL SB-13
3—OSBORN #91, #92, #91-10
1—RANDALL, MODEL "A", Bench Type
1—TACCONE #4D, 10" Draw Stoke Cyl.

CUPOLAS

1—MORRIS #9, Skip charger, Blower, Mixing Ladle, Never Installed
1—SKIP CHARGER for #9 Cupola with scale and buckets
1—TABOR Cupolette, 48" dia, 9" cap.
1—WHITING Skip Charger for #5 Cupola
1—WHITING #4, w/charger & blower, Foxboro Control
2—WHITING #6 w/Skip Chargers, Blowers, and Foxboro Controls

DUST COLLECTORS

1—AMERICAN WHEELABRATOR, Model #115KD, 20' L x 9' W x 9' H
10—ROTOCLONE #12, Type N, #14D, #16W, #20D, #24W, #30W

FLASKS

150 HINES AND FREEMAN ALUMINUM, Popoffs and Jackets
CHERRY WOOD Snap Flasks
200 TRANSITE CORE PLATES, Various sizes
SEND US YOUR REQUIREMENTS

FURNACES—DIRECT ARC MELTING

1—250 Lb. LECTROMELT, Side Charge
1—3,000 #/hr. LECTROMELT

FURNACES—INDUCTION MELTING

1—1 ton AJAX
1—3 KW, AJAX, Lab type
1—20 KW, AJAX SPARK GAP, High Frequency
1—20 KW AJAX, 50 # capacity
1—40 KW AJAX Spark Gap
1—60 KW, 3000 Cycle
1—200 KW AJAX
1—333 KW AJAX 1000 #
1—30 KW LEPEL, 17 lb.

IMMEDIATE DELIVERY

3 Ton Top Charge

SWINDELL ARC FURNACE

Unit is in Excellent Condition, Dismantled, ready for Immediate Delivery.

FURNACES—GAS & OIL

1—FISHER MNP, Gas Tilting, 1700 # cap. Mag.
2—FISHER, Gas, Stationary, 4 Burner, 500 # cap.
1—HAUSFELD, Tilting, 1200 # capacity
1—STROMAN, Gas Tilting, 1000 # cap. Alum., auto control hyd. lift
1—REDA 550 #, Never Used.

GRINDERS

1—5 HP CINCINNATI, 2/60/110
1—5 HP GARDNER, 12" x 2½" wheels
3—5 HP U. S. Model 64, 14" x 2" wheels
1—7½ HP U. S. 2300-8400 RPM, 14" x 2" wheels
1—7½ HP U. S. 3/60/220, 20" wheels
1—7½ HP U. S. Model 66, 14" x 3" wheels
1—10 HP U. S. Model 65, 20" x 3" wheels
4—10 or 15 HP SWING FRAME, 22" wheels

MOLDING MACHINES

Jolt Rollover Pattern Draw

1—J & J #610 RP, 24" x 30" Table, 600 #
1—J & J #1020, 50" x 60" Table, 3000 #
2—J & J #915, 44 x 54 Table, 20" draw
1—J & J #815, 30" x 40", 15" draw, 1200 # jolt
2—INTERNATIONAL, 13" x 17" table, 6" draw
2—HERMAN 10,000 #, 48" x 109" table
1—HERMAN 6000 #, 50" x 72"
1—HERMAN 3000 #, 30" x 66" Table
2—HERMAN 1500 #
1—HERMAN 750 #, 30" x 36"
1—OSBORN #602, 36" x 26", 900 #
1—OSBORN #405, 3000 #, flask size 64" x 50", 18" draw
1—OSBORN #42, 15" x 20", hand draw
4—TABOR 40" x 60", 1500 & 3000 # capacity
2—TABOR, 30" x 40" w/air clamps, 1000 #
1—TABOR 22" x 42", pattern draw, shockless, portable
1—TABOR, 20" x 30" w/air clamps, 1000 #
1—TABOR, 14" x 16" Rockover

PLAIN JOLT

5—DAVENPORT, table sizes 24" x 27", 30" x 30", 1200 # to 1800 #
1—OSBORN #102
1—SPO #5SP, 18" x 28" table, 800 #

Jolt Pin Lift

1—HERMAN #4317, 22" x 30" table
1—J & J #681-C, 30" x 25" table, 600 #
1—MILWAUKEE #1536, 32" x 38", 1500 #
1—OSBORN #559, 25" x 30" table, 6" draw, 1200 #
3—SPO #305 #307, 750 lb., 1500 lb.
1—TABOR, 17" x 20" table, portable
1—TABOR, 20" x 20" table, hand strip
1—TABOR, 20" x 24" table, 600 #

Jolt Squeeze Pin Lift

2—INTERNATIONAL, PKL, 18" x 24" table, 12" sq.
1—MILWAUKEE #126, 21" x 27" table, 12" sq., 1200 #
2—MILWAUKEE #163, 15" x 24" table, 11" sq.
5—OSBORN, #712J, #712PJ, 18" x 28" table, 12" sq.
5—SPO #2114P, 21" x 27" table, 600 #
1—SPO #2136G, 21" x 30" table, 800 #

Jolt Squeezers

2—MILWAUKEE #123, #123-10, 17" x 26" table, 250 #
2—MILWAUKEE #104-5JS, 17" x 21", port.
3—SPO #110J, 17" x 20" table, 10" sq.
4—INTERNATIONAL #10 LJS, 17" x 20"
2—INTERNATIONAL #12 LJS, 17" x 20" table, stationary and portable
8—TABOR, 3" jolt, 17" x 20"
1—NICHOLS #12 F-P, portable, 600 #
43—OSBORN #275J, #275PJ, 16" x 20" tables, 10" sq., 400 #

MATERIAL HANDLING

1—BYERS, Mobile Crane, BUDA Engine, 50' Boom, 5 ton w/magnet & bucket
1—CLARK, Fork Lift, Gas, 300 lb., capacity, Solid Tire

MULLERS AND MIXERS

1—B & P, Conventional, SIMPSON type, 87½" Dia., arranged for cooling
1—CLEARFIELD, #920, 9' Dia., 25-30 cu. ft.
2—LANCASTER Mixers, #4, 5' Dia. Pan, 3-9 cu. ft. cap.
1—MULLER Plaster & Mortar Mixer, 3 cu. ft. batch, Pneumatic Tires
2—SIMPSON #1, 4 cu. ft. batch, 2 wheels, Open Gear
1—SIMPSON #0, 3' Diameter, 175 lbs.
1—SIMPSON, #3, 8' Dia. Open Gear, with loader 20-25 cu. ft. batch

LADLES AND POURING DEVICES

MODERN, SWINDELL, WHITING, TREADWELL—All Types and Sizes—Ready for your Needs!

Size 19¼" x 7½" WHITING "U" Ladle, Tilting Type, Complete w/gas preheating unit, Portable Type, 9200 # capacity

OVENS

1—COLEMAN, OIL, one compartment, recirc., 60" W x 80" H x 14'6" L
1—COLEMAN, Gas, 2 Comp. and 5 drawers, OD, 22" x 12' x 10'
3—GENRICH, elec., 3 drawer, preheating, auto-control, 9' H x 8' W x 6'7" L
2—ROSS, Gas, 2 compartment, recirc., rack type, 6½' x 14' x 7'

SAND CONDITIONING

1—NATIONAL ENGINEERING SAND-PREPARATOR Unit w/permanent magnet pulley
1—ROYER PREPARATOR, Comb. Model NDC, 25 Ton/hr. Scrap removal, 8' x 8' hopper
1—ROYER, NDP, 15-25 tons/hr., 2 HP Motor
1—JEFFREY Sanditioner, Portable, 10-15 tons/hour, 2 H.P. Motor
2—B & P Screenarator, Model "M"

SAND CUTTERS

1—AMERICAN, 15 HP, 96/78 Reel

SHAKEOUTS AND SCREENS

2—HEWITT ROBINS, Vibrating, 18" x 10'
1—HEWITT ROBINS, Vibrex Screen, 3' x 8'
1—SIMPLICITY Screen, 50" x 116"

TENSILE TESTING

10,000 # DETROIT, Hydraulic
100,000 # TINIUS OLSEN, Mech. Beam Testing

MISCELLANEOUS

1—WHITING #3 PULVERIZER, Brand New, w/10 HP G.E. Motor
1—HOWE WEIGHTOGRAPH SCALE, Model 1700
1—KANE & ROACH WIRE STRAIGHTENER, Model DX-5
1—PATTERSON-KELLEY Twin Shell Dry Blender, 3 cu. ft. capacity

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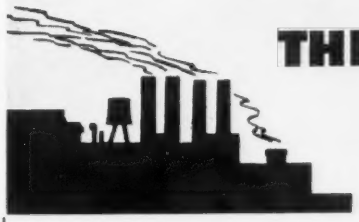

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Ingersoll-Rand Type FS. Single Stage 4000 CFM @ 375 PSI, 100 HP, 220V G. E. Induction motor. General Electric 7500 CFM, 20 oz., 89.6 Max. HP, 220V motor, Airway controls.
Ingersoll-Rand turbo compressor 10500 CFM @ 20 oz. 85 HP G. E. 220V 3500 CFM motor.
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3—International SB 12.
4—International SB 13.
6—Osborn 193.
1—Osborn 2035-2.
1—Champion CB 400.
1—Champion CB 15.
2—CB 10 Late Type.
1—3E Demmler Drop Away Draw.
1—No. 4 Demmler.
2—Redford Bench Type.

CORE GRINDERS
5—Milwaukee 70-9.
1—Owasso #DE-1.

CORE OVENS
1—Thermonic 1800A.

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1—Coleman combination oil or gas fired 43—2 shelf carriers 30" x 144" long. 2 hour 12 min. to 7 hour 24 min. cycle. Present replacement cost over $90,000.

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1—P & H 3 Ton OET Crane, 3 motor, 230V D.C., outdoor type, 45' lift with reel for magnet or bucket service.

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1—Detroit Electric, Single Phase, Size LFY, 750# cold charge cap., 7200V transformer & equipment.

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Eclipse 100# RB stationary gas.
Lindberg 500# ASM 600.

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1—3" x 24" U.S. #65, 20 HP 22/440V.
1—7½ HP Hammond D. E. Snag Grinder.

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1—3" x 24" x 12" Marschke, 20 HP.
1—3" x 24" x 12" U.S. 15 HP.
1—2½" x 20" x 6" U.S., 10 HP.

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3—1 ton D.C. Cab operated Cleveland, Monotractor Hot Metal Carriers.

LADLES
2000# Whiting Jr. & Car.
5000# Modern Geared.
6—2125# Industrial Covered Geared Crane Ladles.
1—6000# Industrial 44" x 44" Geared Covered Crane Ladle.

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1—Milwaukee 103-11 Staty. Jolt Squeezer, 13½" x 20" table.
7—Champion JS10P Portable Jolt Squeeze molding machine, 18" x 21" table.
1—Taccone Model TD4, high production diaphragm molding machine.
2—Milwaukee 104-5 Staty. Jolt Squeezers.
Jolt Squeeze Pin Lifts:
6—712 PJ Osborn, 18" x 28" table.
Osborn 16" Jolt, vibrating squeeze pin lift.
716 PV Osborn Vibrating Squeeze.

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1—Herman 3000# Series 40" x 84" table, special slotted table.
1—Herman 1500# Series 20" x 36" table.
2—Herman 750# Series 20" x 30" table.
2—Herman 750# Series 20" x 24" table.
3—SPO Model 9032.
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3—Tabor Portable Rollover 30".
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2—Simplicity 3 x 5 Shakeouts, Model 35-SOS.

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20 Ton Hannifin S-200.

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3—Rockwell Testers 3YR, Late Type.
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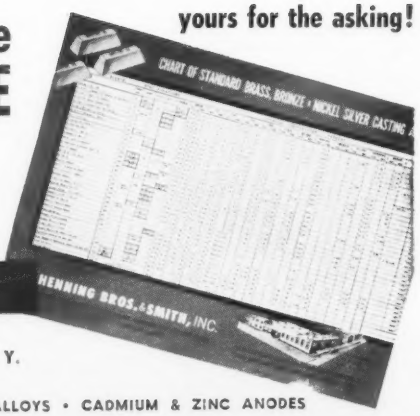

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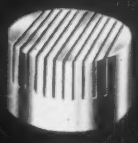

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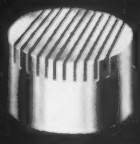

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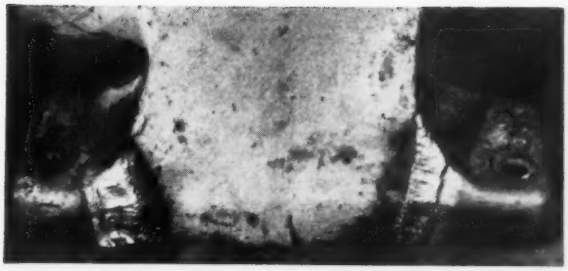

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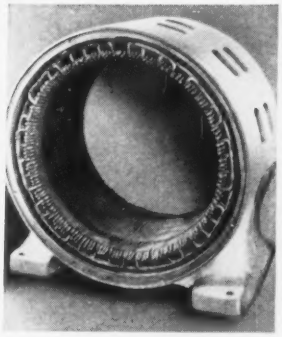

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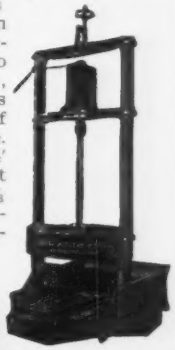
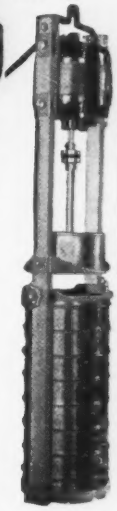
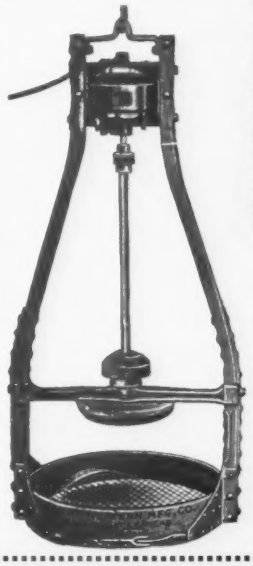
TYPE "CS". Complete price $360.00. 24" square sieve. A continuous operation sieve. Requires no dumping, as refuse is ejected off to one side. Height 4' 10", weight 295 lb., ⅓ H.P. enclosed motor.





TYPE "CR". Complete price $350.00. 24" dia. round sieve. Sifts, fluffs, mixes, aerates sand. Height 4'6", weight 250 lbs., ⅓ H.P. enclosed motor.

PROMPT DELIVERY from your Foundry Supply House



TYPE "HL". Price $250.00 complete, less sieves. Laboratory model especially designed for laboratory sand control fitted with 1/6 H.P. enclosed motor.

TYPE "V". Price 20" Sieve, $275.00. Does the work of 10 men. Screens sand, Fine, Medium, and Coarse. 20" dia. sieve with special clamp for 5-second changes. 4'6" high, weight 100 lbs., fully-enclosed 1/6 H.P. motor. Also available in Giant V-5 with 36" sieve for triple capacity . . . Price $495.00.

MAIL THE COUPON NOW!

GREAT WESTERN MFG. CO.

Leavenworth, Kansas **Phone MU-22291**

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Next Page Circle 775→

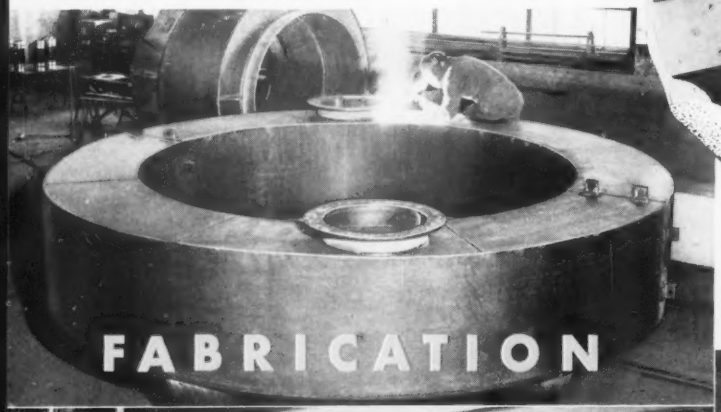
Circle 774 on Page 51

from PLAN to POUR-OFF...

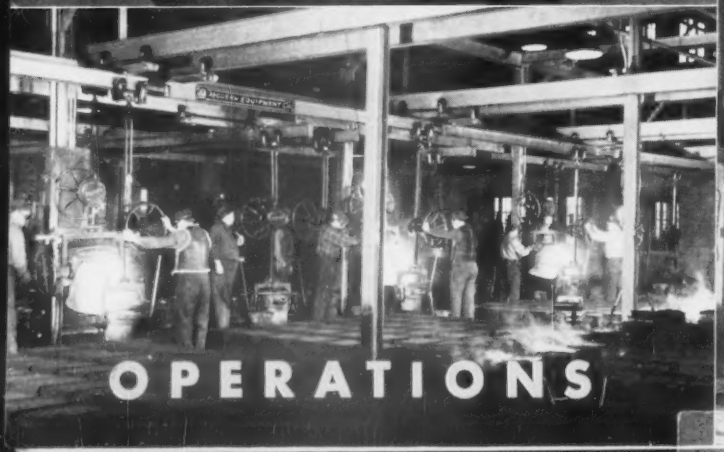
MODERN'S single responsibility originates in engineering and follows on through to fabrication and satisfactory operations . . .

MODERN

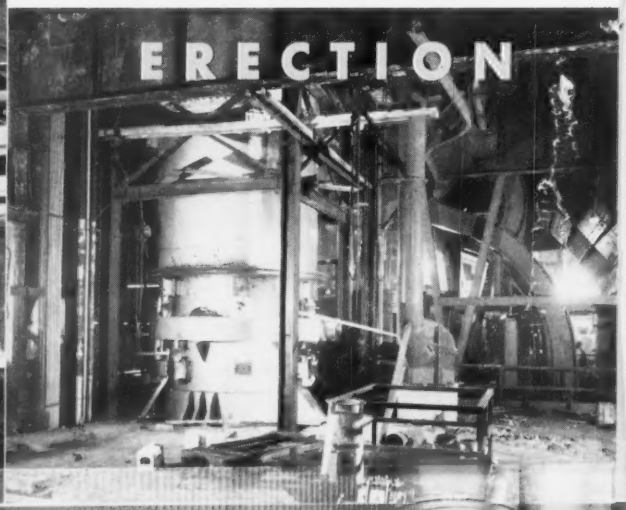
40 YEARS ENGINEERING PLANNING



FABRICATION



OPERATIONS



ERECTION

MODERN EQUIPMENT COMPANY
Dept. F-5
PORT WASHINGTON, WISCONSIN

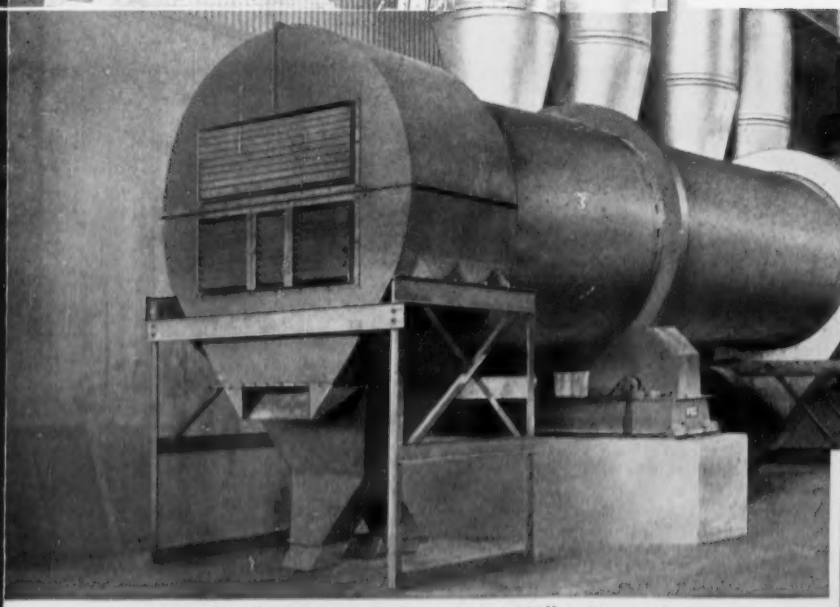
a toast...

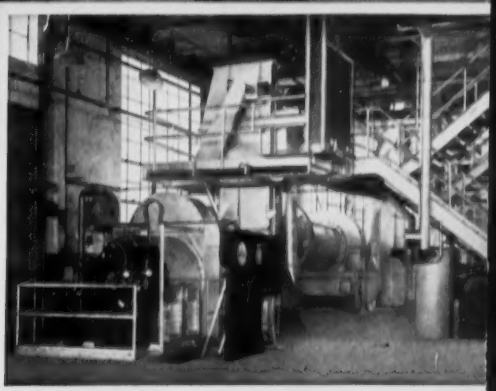
... to our friends and customers
on our 75th anniversary... and
thanks for making it possible

FREDERIC B. STEVENS, INC.

1882 1957

Circle 552 on Page 51

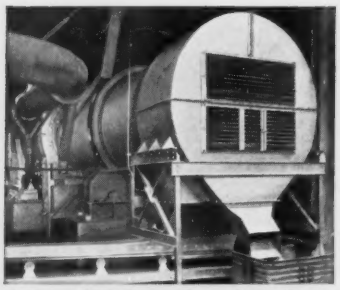




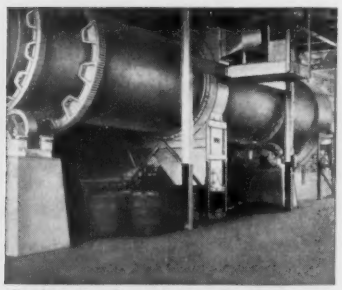
Above: Two Core Sand Rotary Dryer-Coolers 102" in Diameter by 66 Feet Long in Large Automobile Foundry. At the *Right:* Core Sand Dryer-Cooler in Farm Equipment Foundry Showing Furnace Arrangement.

For Your Core Room

combination Dryer-Coolers



Discharge End of Large Dryer-Cooler Showing Belt Conveyor for Dried Sand, and Tailings Chute for Scalpings.



Combination Dryer-Cooler for Bank and Sharp Sand in Large Implement Foundry.

will provide a continuous supply of essentially bone dry sand — within 5° of room temperature "READY TO USE" — regardless of variations in the rate or moisture content of the sand fed

● Assure exact duplication of every core mix — save on binders — get a uniform bake and constant core structure reducing losses of both cores and castings by passing incoming sand through a Bartlett-Snow combination Dryer-Cooler. Gas or oil fired types. Built-in scalping screen removes foreign material. Automatically controlled. Furnished complete with storage and handling equipment. Sizes to meet **your** capacity requirement.

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